

CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report/Environmental Impact Statement

Preliminary Alternatives Analysis Report

San Jose to Merced Section High-Speed Train EIR/EIS

June 2010



California High-Speed Rail Authority



U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH-SPEED TRAIN PROJECT

TASK 3

SAN JOSE TO MERCED
PRELIMINARY
ALTERNATIVES ANALYSIS REPORT

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ES.0 EXECUTIVE SUMMARY

ES.1 Results from the Preliminary Alternatives Analysis

The *Preliminary Alternatives Analysis Report San Jose to Merced Section* (AA) May 2010 incorporates conceptual engineering information and identifies feasible and practicable alternatives to carry forward for environmental review and evaluation in the draft environmental impact report/environmental impact statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

To facilitate the analysis of potential alignment alternatives, station location and design options across the 125-mile San Jose to Merced high-speed train (HST) Section, the overall section was divided into six subsections:

- 1) **San Jose Station Approach:** San Jose HST Station to Tamien Caltrain Station–West Alma Avenue (San Jose)
- 2) **Monterey Highway:** Tamien Caltrain Station–West Alma Avenue (San Jose) to Coyote–South of Bernal Road (San Jose)
- 3) **Morgan Hill–Gilroy:** Coyote–South of Bernal Road (San Jose) to Casa de Fruta (West end of Pacheco Creek Valley)
- 4) **Pacheco Pass:** Casa de Fruta (West end of Pacheco Creek Valley) to Interstate 5 (Santa Nella Village)
- 5) **San Joaquin Valley Crossing:** Interstate 5 (Santa Nella Village) to Merced/Fresno Wye (Merced or Madera County)
- 6) **Wye to Merced/Fresno Section—Merced:** Merced/Fresno Wye (Merced or Madera County) to Merced Station

Figure ES-1 shows those alignment alternatives recommended to be carried forward for evaluation in the San Jose to Merced Section draft EIR/EIS. Table ES-1 at the end of this section summarizes by alignment alternative within each subsection the proposed decisions regarding the withdrawal or carrying forward of the alignment into the draft EIS/EIR. Alignments recommended for continued study are:

- San Jose Station Approach: SR 87/I-280
- Monterey Highway: Refined Program Alignment
- Morgan Hill–Gilroy: East of UPRR to Downtown Gilroy (Program Alignment); US 101 to Downtown Gilroy; US 101 to East of Gilroy; East of UPRR to East Gilroy; Downtown Gilroy: HST Trench Design Option
- Pacheco Pass: Close Proximity to SR 152; Refined Program Alignment
- San Joaquin Valley Crossing: Henry Miller Road to Avenue 24 (Refined Program); Henry Miller Road to Avenue 21
- Wye to Merced/Fresno Section—Merced: A-1 BNSF and A-2 UPRR

The HST stations recommended for continued study are:

- San Jose Station: Over Diridon Platforms
- Morgan Hill–Gilroy Station: Downtown Gilroy (Four-Track) (Aerial and Trench); East Gilroy (Four-Track)
- Merced Station: See *Merced to Fresno Preliminary Alternatives Analysis Report* (see <http://www.cahighspeedrail.ca.gov/library.asp?p=8732>)

The Authority and the FRA, in addition to performing engineering and environmental analysis, have engaged the agencies, public and the communities throughout the corridor and continue to incorporate their input. The observations below outline some of the highlights from the work and input received to-date:

- Local agencies, community groups and the public all proposed underground options for the San Jose Diridon Station and Approach, and it is the preference of the City of San Jose to continue investigation of the most viable tunnel concept. After considerable study of both deep mined stations and shallower cut-and-cover options, it is

concluded that all underground options are not practicable due to unsafe mining conditions (poor soils combined with high groundwater), construction schedule, potential for settlement, extensive surface disruption and very high construction cost and should be eliminated from further evaluation. In the case of the shallow tunnel option, the proposed BART station and extensions north to Santa Clara and east to downtown San Jose would also have to be redesigned and placed much lower in the existing poor ground conditions. Locating the HST Station above the existing Diridon Station platforms would maximize connectivity and development potential in the station area. The AA Report also recommends eliminating from further consideration the program alignment through the Greater Gardner community because of potential impacts to the neighborhoods including community cohesion, noise/vibration, visual, impacts on Fuller Park and displacement of a nonprofit (house of worship). The recommended alternative (SR 87/I-280) would minimize impacts by utilizing the existing freeway corridors for much of the approach to the station and would move the alignment away from the Greater Gardner neighborhood.

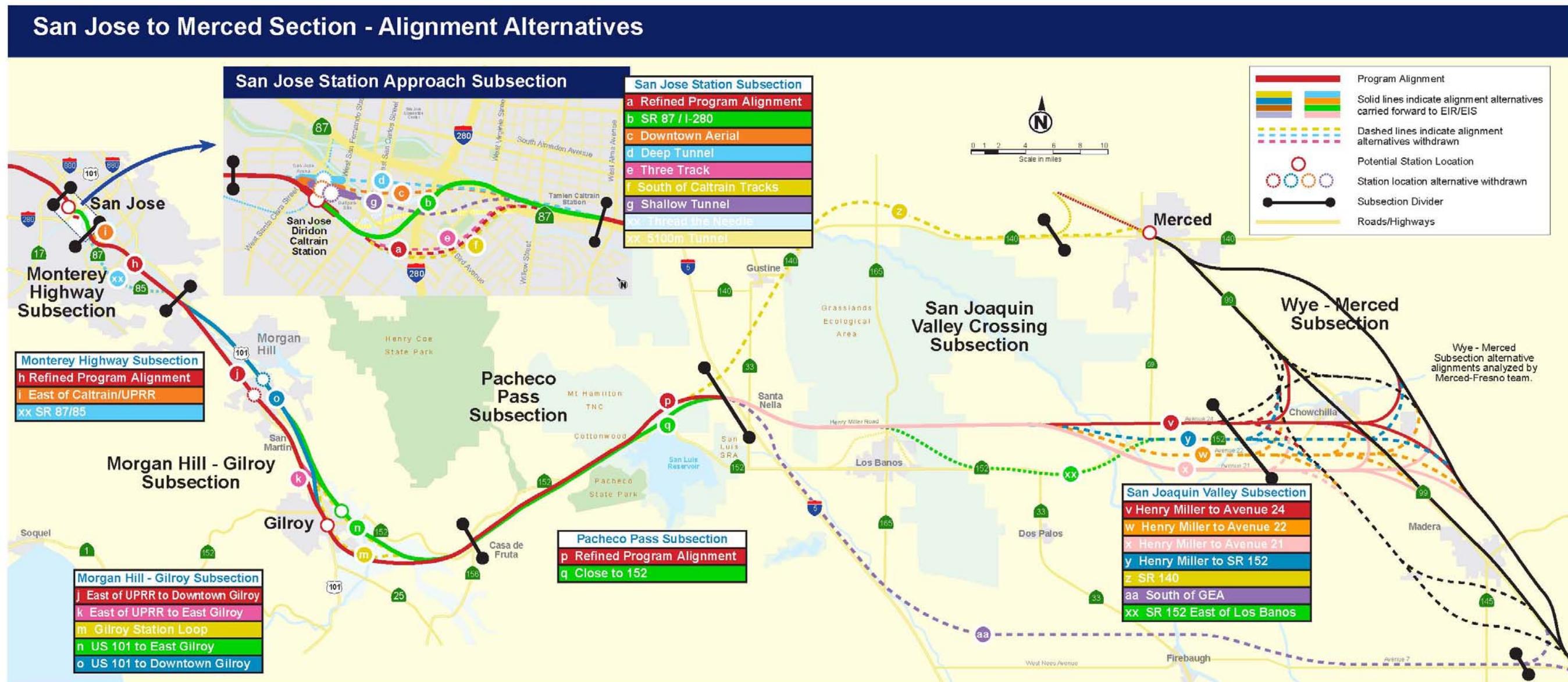
- ◆ Many options have been evaluated between Morgan Hill and Gilroy and the recommendation is to continue the study of both the Monterey Highway/UPRR corridor and US 101 corridor, with a station either in downtown Gilroy or an area to the east of Gilroy. The Monterey Highway/UPRR corridor alternative would be adjacent to and avoid UPRR operating right-of-way. The recommendation is to continue to investigate both the trench and aerial structure options through downtown Gilroy and for a downtown Gilroy Station.
- ◆ A state-of-the-art optimization tool was used to refine the program alignment through the Pacheco Pass. This tool was used to identify the feasible/practicable alternatives and then minimize impacts by bringing the alignment closer to SR 152. More detailed design will further refine the precise location and profile of the two design options at the eastern end of the pass to the north of the San Luis Reservoir.
- ◆ As agreed in the Program EIR/EIS, alternatives north and south of the Grassland Ecological Area (GEA) target boundary were evaluated in addition to the Henry Miller Road alignment. The alternative to the north of the GEA would be incompatible with Proposition 1A by increasing travel time between San Francisco and Los Angeles by over four minutes and would have a high level of impact to residential properties, parklands, and agricultural lands. The alternative to the south of the GEA would add fourteen minutes to the travel time between San Jose and Merced and have much higher environmental impacts due to the twenty additional miles of HST alignment. Two options are recommended for continued investigation for the connection between Henry Miller Road and the Merced-Fresno HST Section: Avenue 24 (program alternative) and Avenue 21. These two east-west alignments would connect to either the A-1 BNSF alignment or the A-2 UPRR Alignment between Merced and Fresno. The location of the wye connections between these east-west and north-south alignments will be important in minimizing local impacts.

ES.2 Alternative Analysis Evaluation Measures

The alignment alternatives, station location and design options carried forward into the detailed alternatives analysis were assessed for each of the project objectives and evaluation measures. This information was then used to determine which alternatives are feasible and practicable and should be carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. The primary evaluation measures are listed below.

- ◆ Design objectives (including measures such as travel time and cost)
- ◆ Land use (including measures such as consistency with land use and general plans)
- ◆ Constructability (including measures such as track type construction and access to the corridor)
- ◆ Community impacts (including measures such as amount of land acquisition)
- ◆ Natural resources (including measures such as impacts to wetlands, potential threatened and endangered species habitat, and important farmlands)
- ◆ Environmental quality (including measures such as number of sensitive noise receptors)
- ◆ Additional considerations (including measures such as ability to meet project purpose and support by public and agencies)

Figure ES-1: Alignment Alternatives Carried Forward for Evaluation in the Draft EIR/EIS



ES.3 San Jose to Merced Section HST Project Background

The route development for the San Jose to Merced Section is built on the set of HST network alternatives and HST alignment alternatives that were analyzed in the *2005 Final Program EIR/EIS for the Proposed California High-Speed Train System* and the *2008 Bay Area to Central Valley HST Final Program EIR/EIS*. The program Statewide and Bay Area to Central Valley documents resulted in the identification of a preferred corridor for the Bay Area to Central Valley section of the HST system.

As part of the HST Alternative selected for further analysis, the Authority and the Federal Railroad Administration (FRA) defined a corridor between San Francisco and San Jose along the San Francisco Peninsula and between San Jose and the Central Valley through the Pacheco Pass and via Henry Miller Road. In July 2008, the Authority selected the Pacheco Pass to San Francisco via San Jose as the network alternative for connecting the Bay Area with the Central Valley. The selected Pacheco Pass network alternative included general alignments between San Jose and Gilroy, over the Pacheco Pass, across the San Joaquin Valley, and north to Merced, which would be studied further in project EIRs.

However, due to a recent court ruling, the Authority has reopened the related environmental document and is working to address issues identified by the court as part of a revised and recirculated environmental document. The Authority will consider the revised materials and the entire record before making a new certification decision on the revised program EIR under CEQA. The Authority also will make a new programmatic decision on a network alternative for connecting the Bay Area with the Central Valley that it will study at the project level. The court ruling did not require the Authority to stop the work being done on the project-specific environmental review.

The corridor that has been studied at the project level extends approximately 125 miles, starting at the Diridon train station in San Jose, where it connects with the San Francisco to San Jose HST Section, runs south of Gilroy and then east through the mountainous Pacheco Pass to Chowchilla, where it connects with the Merced to Fresno HST Section. Stations are planned in San Jose, Gilroy and Merced.

ES.4 Public and Agency Outreach Efforts

In February 2009, the Authority, in cooperation with the FRA began a project-level environmental review of the San Jose to Merced HST Section per requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). In March 2009, scoping meetings were held to receive input on the scope of issues that should be analyzed in the EIR/EIS. The meetings are summarized in the San Jose to Merced Section High Speed Train Project EIR/EIS Draft Scoping Report (August 2009). (see <http://www.cahighspeedrail.ca.gov/library.asp?p=8281>).

In addition, a number of agency, general public and small group meetings were held throughout the alternatives analysis phase. The purpose of these meetings was to explain the alternatives analysis process, share the results of the preliminary studies with the public and agencies and receive feedback.

Input at these meetings and other comments were distilled to produce initial alignment alternatives and station and design options for consideration in this AA Report. Feedback from the public and agencies included issues such as noise, visual impacts, vibration, community cohesion, biological impacts, project cost and funding, right-of-way, and more.

ES.5 Next Steps

This *Preliminary Alternatives Analysis Report San Jose to Merced Section* informs the Project Description for the EIR/EIS. It also sets parameters for the next level of design (15 percent) and environmental analysis. This ongoing work will provide the Authority, FRA and the communities in the San Jose to Merced corridor more details and a fuller picture of the design options in each subsection and a comprehensive vision of the entire corridor.

As the engineering and environmental work continues, the Authority will continue to meet and engage communities along the San Jose to Merced corridor in a discussion about the different alternatives. If deemed necessary by the lead agencies, a Supplemental Alternative Analysis Report will consider feedback received on this Preliminary Alternative Analysis Report and will discuss how the alternatives analysis will inform the detailed engineering, environmental and outreach activities in the San Jose to Merced corridor. These activities will inform preparation of the draft EIR/EIS, which is currently scheduled for public comment in July 2011.

Table ES-1: Alignment Alternatives and Station Location Options Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION							ENVIRONMENTAL/OTHER CONCERNS			
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/Accessibility	Revenue/Ridership	Alignment Eliminated*	Environment				
San Jose Station Approach Subsection													
Refined Program Alignment		X		P	S					Community impacts: Residential displacement, Nonprofit (house of worship) displacement; Noise/Vibration; Biological; Cultural; Visual; Parkland resources			
South of Caltrain Tracks		X			P					P	Property impacts, Community impacts; Residential displacement; Nonprofit (house of worship) displacement, Noise/Vibration; Biological; Cultural; Visual; Parkland resources		
Three Track		X		P						Fully inconsistent with Caltrain Operating Plan			
Deep Tunnel		X	P							S	Major constructability issues (poor soils, high groundwater, potential settlement); Business displacement; Cultural resources; Construction impacts; Substantial costs		
Shallow Tunnel		X	P	S	P					S	Relocation (lowering) of proposed BART station under HST Station in poor soils/high groundwater; lowering of BART tunnels; Impacts to Los Gatos Creek; Business displacement; Biological and cultural resources; Construction impacts; Substantial costs		
Downtown Aerial		X	P	P						P	Residential/ business displacement; Biological, cultural and visual resources; Community concerns		
SR 87/I-280	X									Business displacement; Biological, cultural and parkland resources			
Station Location Options													
San Jose HST Station: Over Diridon Platforms	X									Biological and visual resources			
San Jose HST Station: Aerial Station East of Existing Diridon Station		X							P	Biological, cultural, visual and parkland resources			
San Jose HST Station: Underground Station East of Existing Diridon Station		X						P		Major constructability issues and construction impacts			
Monterey Highway Subsection													
Refined Program Alignment	X									Business displacement; biological and cultural resources			
East of Tamien Platform		X	P							S	Biological and cultural resources; Disruption to existing railroads; Construction impacts; low speed curve entering Monterey Highway		
Morgan Hill-Gilroy Subsection													
East of UPRR to Downtown Gilroy (Program Alignment)	X									Residential/business displacements; Biological, cultural and agricultural resources			
US 101 to Downtown Gilroy	X									Residential/business displacements; Biological, cultural, agricultural, parkland and visual resources			
Gilroy Station Loop		X							P	Residential/business displacements; Biological, cultural, agricultural, parkland and visual resources; High capital costs; Community concerns			
US 101 to East Gilroy	X									Residential displacements; Biological, cultural, parkland and agricultural resources			
East of UPRR to East Gilroy	X									Residential/business displacements; Biological, cultural and agricultural resources			
Design Option													
Downtown Gilroy: HST Trench	X									Construction impacts; High costs			
Station Location Options													
Morgan Hill Downtown (Four-track)		X						P	Visual resources; Agency concerns				
Downtown Gilroy (Four-track)	X								Business displacements; cultural and visual resources				
Downtown Gilroy (Two-track)		X						P	Cultural and visual resources				
East Gilroy (Four-track)	X								Biological, agricultural and visual resources				
Morgan Hill US 101 at Cochrane (Four-track)		X						P	Agency concerns				
Notes: Reason: Primary (P) and secondary (S) reasons for elimination.													

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/Accessibility	Revenue/Ridership	Alignment Eliminated*		
*Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.										
Pacheco Pass Subsection										
Refined Program Alignment	X									Biological, agricultural and parkland resources
Close Proximity to SR 152	X									Biological, agricultural and parkland resources
San Joaquin Valley Crossing Subsection										
Henry Miller Road to Avenue 24 (Revised Program Alignment)	X									Residential displacements; Biological and agricultural resources; Agency concerns
SR 140		X	S					P		Residential/business displacements; Biological, agricultural and parkland resources; Increased travel time
South of GEA		X						P		Biological, agricultural and parkland resources; Residential/business displacements; Results in additional time and distance with resulting costs and impacts
Henry Miller Road to SR 152		X	P							Constructability issues; Residential/business displacements; Biological and agricultural resources; Agency concerns
Henry Miller Road to Avenue 21	X									Residential displacements; Biological and agricultural resources
Henry Miller Road to Avenue 22		X	P					S		Residential displacements; Biological and agricultural resources; Agency concerns
Notes: Reason: Primary (P) and secondary (S) reasons for elimination.										
*Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.										

1.0 INTRODUCTION

The California High-Speed Rail Authority (the Authority) is studying alternative alignments for a high-speed train (HST) section between San Jose and Merced. This report incorporates conceptual engineering information and identifies feasible and practicable alternatives to carry forward for environmental review and evaluation in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) for the San Jose to Merced Section of the California HST Project.

Additionally, the Authority and the Federal Railroad Administration (FRA) have entered into a memorandum of understanding (MOU) with the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to integrate the NEPA process with the Clean Water Act (CWA) Section 404 process. The Section 404 (b)(1) process includes an alternatives analysis and, therefore, the objective is for the EPA and the USACE to reach concurrence with the Authority and the FRA on the alternatives to be carried forward into the EIR/EIS.

1.1 California HST Project Background

The California HST is planned to provide intercity, high-speed train service on more than 800 miles of tracks throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The HST system is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which will include contemporary safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment, with an expected express trip time between Los Angeles and San Francisco of approximately 2 hours and 40 minutes.

The California HST project will be planned, designed, constructed, and operated under the direction of the Authority, a state governing board formed in 1996. The Authority's statutory mandate is to develop a high-speed rail system that is coordinated with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

1.2 San Jose to Merced EIR/EIS Background

The San Jose to Merced HST Section is a critical link connecting the San Francisco to San Jose HST Section to the Merced to Fresno HST Section. The route development for the San Jose to Merced Section is built on the set of HST network alternatives and HST alignment alternatives that were analyzed in the *2005 Final Program EIR/EIS for the Proposed California High-Speed Train System* and the *2008 Bay Area to Central Valley HST Final Program EIR/EIS*. The HST alignment alternatives considered as part of the program-level process are described in this Preliminary Alternatives Analysis (AA) Report, within Section 3.2 Program Level Alternatives.

The 2008 Bay Area to Central Valley HST Final Program EIR/EIS identified a preferred network alternative for the Bay Area to Central Valley section of the HST system that would include alignments between San Francisco and San Jose along the Caltrain Corridor, and between San Jose and the Central Valley through the Pacheco Pass and via Henry Miller Road. In July 2008, the Authority selected the Pacheco Pass to San Francisco via San Jose as the network alternative for connecting the Bay Area with the Central Valley, to be studied in more detail at the project level.

Based on the court ruling in *Town of Atherton v. California High Speed Rail Authority*, the Authority board rescinded its certification of the 2008 Bay Area to Central Valley HST Final Program EIR in December 2009 and its selection of preferred alignments and station locations for further study at the project level. The Board's action included rescinding the alignment selection for the portion of the study area between San Jose and Merced. The Authority has circulated a document entitled, Revised Draft Program EIR Material and the comment period closed on April 26. The Board is expected to consider the 2008 Final Program EIR along with a Revised Final Program EIR Material document, including responses to comments, in the coming months. The Authority will also make a new programmatic decision on a network alternative for connecting the Bay Area with the Central Valley that it will study at the project level. The court ruling did not require the Authority to stop the work being done on the project-specific environmental

review. The corridor that has been studied at the project level extends approximately 125 miles, starting at the Diridon train station in San Jose, where it connects with the San Francisco to San Jose HST Section, runs south of Gilroy and then east through the mountainous Pacheco Pass to Chowchilla, where it connects with the Merced to Fresno HST Section. Stations are planned in San Jose, Gilroy and Merced.

In February 2009, the Authority, in cooperation with the FRA began a project environmental review of the San Jose to Merced HST Section per requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). In March 2009, scoping meetings were held to receive input on the scope of issues that should be analyzed in the EIR/EIS. The meetings are summarized in the *San Jose to Merced Section High Speed Train Project EIR/EIS Draft Scoping Report* (August 2009).

Input at these meetings and other comments were distilled to produce initial alignment alternatives and station and design options for consideration in this AA Report, as described in Section 3.3 Initial Development of Alternatives.

1.3 Study Area

The San Jose to Merced Section study area of the California HST project is approximately 125 miles long. The limits are from the San Jose HST Station to the east through the planned junction (wye) with the Merced to Fresno HST corridor and then north to Merced. The San Jose to Merced Section comprises three distinct geographic areas, with a forth covered by the Merced to Fresno team, as described below.

1.3.1 SAN JOSE TO GILROY HST STUDY AREA

The San Jose to Gilroy study area (approximately 36 miles; see Figure 1.3-1) is in the Santa Clara Valley and generally follows the Caltrain and Union Pacific Railroad (UPRR) corridor until it turns east toward the Pacheco Pass. Development is densest in this segment, from the city center of San Jose, through suburban neighborhoods and business parks of San Jose, Morgan Hill and Gilroy, to the lower density suburban and agricultural areas around Gilroy. Due to the nature of development, potential alignments in this area seek to closely follow existing transportation corridors to reduce impacts on existing development.

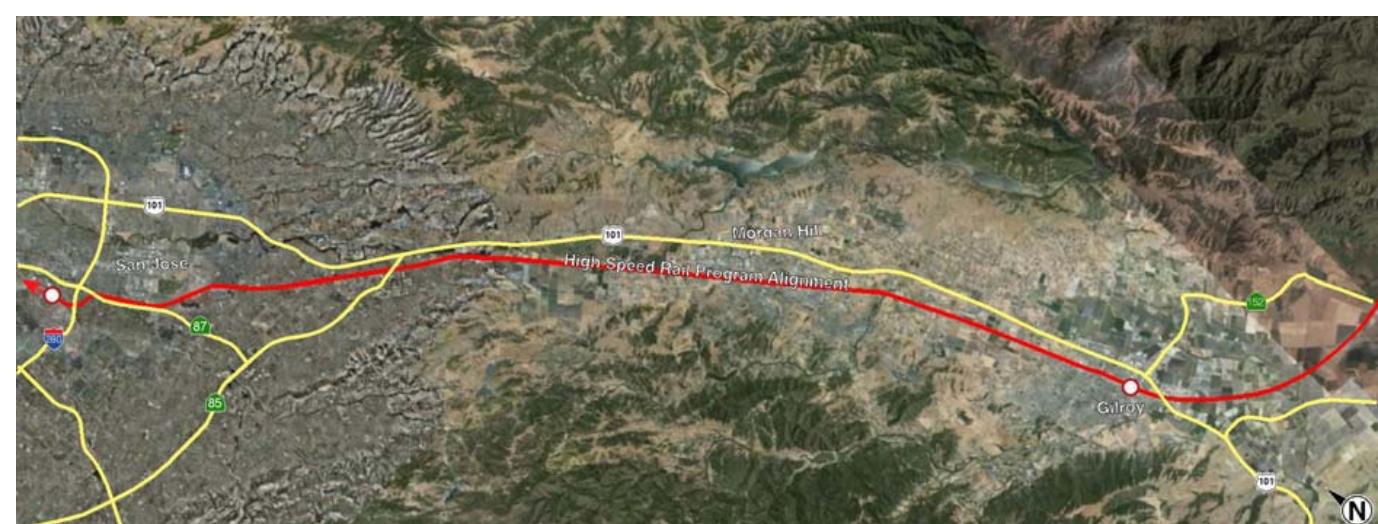


Figure 1.3-1: San Jose to Gilroy HST Study Area

1.3.1.2 Gilroy to Santa Nella HST Study Area

The Gilroy to Santa Nella (at Interstate 5) study area (approximately 21 miles) crosses the open spaces of the Pacheco Creek Valley, Pacheco Pass and San Luis Reservoir (see Figure 1.3-2). State Route 152 traverses the Gilroy to Santa Nella study area between Gilroy and Interstate 5. The potential alignment alternatives here must balance the difficulty and cost of building a 220 mph railway through the hills taking into account the varied interests of ranchers, resource groups, and established conservation areas.



Figure 1.3-2: Gilroy to Santa Nella HST Study Area

1.3.1.3 Santa Nella to Chowchilla HST Study Area

The Santa Nella to Chowchilla study area extends from Santa Nella to the Merced to Fresno Corridor (approximately 45 miles). The study area crosses the San Joaquin Valley (see Figure 1.3-3) and generally follows Henry Miller Road, a two-lane road extending from Santa Nella to Los Palos. Here, wildlife concerns must be balanced with potential impacts to agriculture and land use plans of Los Banos and Chowchilla. The Grasslands Ecological Area (GEA) is within this area, along with the myriad of established agricultural uses.

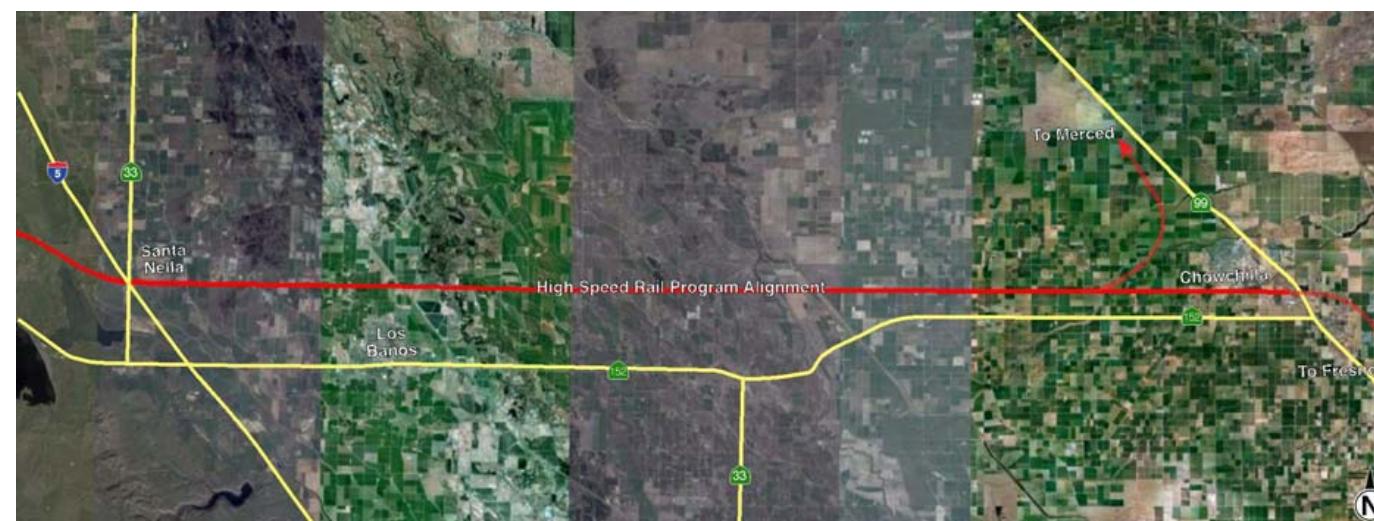


Figure 1.3-3: Santa Nella to Chowchilla HST Study Area

1.3.1.4 Chowchilla to Merced HST Study Area

The Chowchilla to Merced study area extends from Chowchilla to Merced. This area is covered by the *Merced to Fresno Section Preliminary Alternatives Analysis*.

1.4 Purpose of Study

This AA Report uses preliminary planning and environmental and conceptual engineering information to identify feasible and practicable alternatives to carry forward for environmental review and preliminary engineering design in the San Jose to Merced HST Project EIR/EIS. This report is intended to identify the range of potentially feasible alternatives to analyze in the draft Project EIR/EIS. It documents the preliminary evaluation of alternatives, indicating how each of the alternatives meets the purpose for the HST project, how evaluation criteria were applied and used to determine which alternatives to carry forward for detailed environmental analysis, and which alternatives should not be carried forward for further analysis.

The analysis begins with the alignment corridors selected at the conclusion of the 2005 Final Statewide Program EIR/EIS process and 2008 Bay Area to Central Valley Program EIR/EIS. Public and agency comments received during the San Jose to Merced Project EIR/EIS scoping period and during ongoing interagency coordination meetings, were used to identify initial alternatives to carry forward for this AA process. After initial project alternatives were identified, conceptual alignment plans, profiles, and cross-sections were developed and used for this evaluation of alternatives.

Section 2.0 describes the evaluation measures used for the AA process. Each of the project alternatives is described in detail in Section 3.0. Section 4.0 evaluates the alternatives, and Section 5.0 summarizes the results of the AA analysis.

2.0 ALTERNATIVES DEVELOPMENT PROCESS

The process for this study involves the creation and refinement of alternatives, through a series of processes that are intended to compare alternatives. This study follows a defined alternative analysis process as described in the Technical Memo *Alternatives Analysis Methods for Project EIR/EIS, Version 2 (October 2009)*, and uses both qualitative and quantitative measures that reflect a mixture of applicable policy and technical considerations.

The techniques that are used to gather information and to develop and compare alternatives are described below.

Field Inspections of Corridors: Planners, engineers, and analysts with experience in railroad operations, conducted field inspections of the potential alignment, right-of-way, and station locations to identify conditions and factors that may not be visible in aerial photos or on maps. Over the course of the study, field inspections become progressively more detailed as the alternatives were refined by the planning and engineering work.

Project Team Input and Review: The project team conducted team meetings to discuss alternatives and local issues that potentially affect alignments.

Qualitative Assessment: A number of the qualitative measures used to describe the alternative alignments were developed by project team members with experience in construction and operation of high-speed rail and other transportation systems. These measures included constructability, accessibility, operations, maintenance, right-of-way, public infrastructure impacts, railway infrastructure impacts, and environmental impacts.

Engineering Assessment: Engineering assessments were provided for a number of measures that could be readily quantified at this stage of project development. The engineering assessments provided information on project length, travel time, and configuration of key features of the alignment such as the presence of existing infrastructure.

Geographic Information System (GIS) Analysis: The bulk of the assessment was performed using GIS data, which enabled depictions of the project's interactions with a variety of measurable geographic features, both natural and built. GIS data was used to assess impacts on farmland, water resources, floodplains, wetlands, threatened and endangered species, cultural resources, current urban development, and infrastructure.

2.1 HST Project Purpose

The purpose of the California High-Speed Train (HST) Project is to implement the statewide HST System in sections along the corridors selected in program-level (Tier 1) decisions that will: (1) link Southern California cities, the Central Valley, Sacramento, and Bay Area; (2) provide a new transportation option that increases mobility throughout California; (3) provide reliable HST service that delivers predictable and consistent travel times using electric powered wheel trains; and (4) provide a transportation system that is commercially viable.

The Authority's objectives and policies for the proposed HST system are as follows:

- ◆ Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports.
- ◆ Meet future intercity travel demand that will be unmet by present transportation systems, and increase capacity for intercity mobility.
- ◆ Maximize intermodal transportation opportunities by locating stations to connect with local transit, airports, and highways.
- ◆ Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel.
- ◆ Provide a sustainable reduction in travel time between major urban centers.
- ◆ Increase the efficiency of the intercity transportation system.
- ◆ Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.
- ◆ Develop a practical and economically viable transportation system that can be implemented in phases by 2020 and generate revenues in excess of operation and maintenance costs.

2.2 Identification of Alternatives to be Carried Forward

The aim of this report is to document the evaluation process and to identify alternatives that should be carried forward through the environmental process and engineering design. Significant issues that would qualify an alternative to be carried forward for further consideration include:

- ◆ Alternative meets purpose and need and the project objectives in providing a sustainable reduction in travel time between major urban centers.
- ◆ Alternative has no environmental or engineering issues that would make approvals infeasible.
- ◆ Alternative is feasible and practical to construct.
- ◆ Alternative reduces or avoids adverse environmental impacts.

2.3 HST Design Objectives

To determine each alternative's ability to meet the HST project purpose and need, the alternatives are evaluated using HST system performance criteria that address design differences and qualities in the alignment and station locations. These objectives and measures are summarized in Table 2.3-1.

Table 2.3-1: Alignment and Station Performance Objectives and Evaluation Measures

Design Objectives	Criteria
Maximize ridership/revenue potential	Travel Time
	Route Length
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Operating costs
	Capital cost

2.4 Comparison of Project Alternatives

In addition to the HST project objectives and evaluation measures presented in Section 2.3, there are additional measures used to evaluate and compare the project alternatives: land use, constructability, community impacts, natural resources, environmental quality, and additional considerations. Each of these five additional measures is discussed below.

Land Use: Alternatives and station locations are evaluated to determine whether surrounding land use supports transit use; whether the alternatives and station locations are consistent with existing adopted local, regional, and state plans; and whether they are supported by existing or future growth areas (Table 2.4-1).

Constructability: Alternatives are evaluated to determine whether construction of the alternative is feasible in terms of complexity of construction and right-of-way constraints (Table 2.4-2).

Table 2.4-1: Land Use Evaluation Measures

Land Use		
Measurement	Method	Source
Development potential for Transit Oriented Development (TOD)	Identify existing and proposed land uses within ½-mile of station locations. Identify if there are TOD districts, TOD overlay zones, mixed use designations, or if local jurisdiction have identified station areas for redevelopment or economic development.	Regional and local planning documents, and land use analysis and input from local planning agencies
Consistency with other planning efforts and adopted plans	Qualitative – general analysis of applicable planning and policy documents.	General and comprehensive plans, existing and future land use maps

Table 2.4-2: Constructability Evaluation Measures

Constructability and Right-of-Way		
Measurement	Method	Source
Constructability	Extent of feasible access to alignment for construction within existing transportation right-of-way	Conceptual design plans and maps
Disruption to existing railroads	Right-of-way constraints and impacts on existing railroads	Conceptual design plans and maps
Disruption to and relocation of utilities	Number of potential utility diversions	Conceptual design plans and maps

Community Impact: Alternatives and station locations are evaluated for their ability to minimize disruption to neighborhoods and communities. They are measured by the extent to which they minimize right-of-way acquisitions, minimize division of established communities, and minimize conflicts with community resources (Table 2.4-3).

Table 2.4-3: Community Evaluation Measures

Disruption to Neighborhoods and Communities		
Measurement	Method	Source
Displacements	If possible, number of properties by land use type that would be displaced, or acres of land within the right-of-way/station footprint, by type of land use: single family, multifamily, retail/commercial, industrial, etc.	Identified comparing the alignment conceptual design drawings with aerial photographs, zoning maps, and General Plan maps
Property with access affected	Identify potential locations along the alignments or at station locations where access would be affected.	Estimated off conceptual design plans and aerial photographs
Local traffic effects around stations	Identify potential locations where increases in traffic congestion or LOS are expected to occur.	Existing traffic LOS from local jurisdictions
Highway grade separations and road closures	Identify potential locations of grade separations and road closures.	Conceptual design plans and aerial photographs

Environmental Resources: Alternatives are evaluated for their ability to minimize impacts on natural environmental resources (Table 2.4-4).

Table 2.4-4: Environmental Resources Evaluation Measures

Environmental Resources		
Measurement	Method	Source
Waterways and wetlands and natural preserves or biologically sensitive habitat areas affected.	Identify new bridge crossings required; rough estimate of acres of wetlands, linear feet of waterways; acres and species of T&E habitat affected; acres of natural areas/critical habitat affected.	Measured off conceptual design plans and GIS layers
Cultural resources	Identify locations of National Register of Historic Places or California Historical Resources Information System listed properties. For archaeological resources, identify areas of high, moderate or low sensitivity based on previous studies conducted in the study area.	Conceptual design plans and GIS layers; existing Section 4(f) studies and cultural resource records search and surveys
Parklands	Identify number and acres of parks that could be directly or indirectly affected. This would also include major trails that would be crossed.	Conceptual design plans and GIS layers; Existing Section 4(f) studies
Agricultural lands	Identify acres of prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance within preliminary limits of disturbance.	Conceptual design plans and GIS layers

Natural Environment: Alternatives are evaluated for their ability to enhance environmental quality. They are measured by the extent to which they minimize impacts on the natural environment (Table 2.4-5).

Table 2.4-5: Natural Environment Evaluation Measures

Natural Environment		
Measurement	Method	Source
Noise and vibration effects on sensitive receivers	Identify types of land use activities that would be affected by HST passby noise and ground vibrations.	Results of FRA screening level assessment; inventory of potential receivers from site survey and aerial maps
Change in visual/scenic resources	Identify number of local and scenic corridors crossed and scenic/visual resources that would be affected by HST elevated structures in scenic areas and shadows on sensitive resources (parks). Identify locations where residential development is in close proximity to elevated HST structures.	Result of general assessment. Survey of alignment corridors and planning documents.
Maximize avoidance of areas with geological and soils constraints	Identify number of crossings of known seismic faults, acres of encroachment into areas with highly erodible soils, acres of encroachment into areas with high landslide susceptibility.	U.S. Geological Survey maps and available GIS data.
Maximize avoidance of areas with potential hazardous materials	Hazardous materials/waste constraints	Data from previous records search conducted for other projects within study area

3.0 Project Alternatives

The evaluation of alternatives is based on the key differentiators between alternatives. This section describes the No Project Alternative, the initial range of alternatives reviewed, and the alternatives carried forward for detailed evaluation in the Alternatives Analysis.

3.1 No Project Alternative

The No Project Alternative represents the existing conditions of the San Jose to Merced section as it exists today and as it would exist in the future without the HST Project based on future development projects and improvements to the intercity transportation system that are programmed and funded for construction. The No Project Alternative is the basis for comparison of the HST build alternatives. It satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed. The No Project Alternative represents the state's transportation system (highway, air, and conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently projected in the Regional Transportation Plans (RTPs), that have identified funds for implementation, and that are expected to be in place by 2035. The No Project Alternative addresses the geographic area that serves the major destination markets for intercity travel and that would be served by the proposed San Jose to Merced Section alternatives. This area extends generally from San Jose to Gilroy through the Pacheco Pass and San Joaquin Valley to Merced.

The No Project Alternative includes programs and projects identified from the following sources:

- ◆ State Transportation Improvement Programs (STIP)
- ◆ Valley Transportation Plan 2035, Santa Clara Valley Transportation Authority, Adopted in 2008
- ◆ 2007 Regional Transportation Plan for Merced County, Merced County Association of Governments (MCAG), Adopted May 17, 2007
- ◆ 2007 Regional Transportation Plan, Madera County Transportation Commission, Adopted May 23, 2007
- ◆ 2005 San Benito County Regional Transportation Plan, Adopted in March 2005
- ◆ Airport plans
- ◆ Intercity passenger rail plans

The No Project Alternative includes highway, aviation, conventional rail and transit elements, as discussed below.

3.1.1 HIGHWAY ELEMENT

The No Project Alternative highway system that currently serves the intercity travel market in the area that would be served by the San Jose to Merced Section alternatives includes the existing highway routes identified in Table 3.1-1.

Table 3.1-1: Existing California Intercity Highway System

Interstate Highways	U.S. Highway	State Routes
I-5	US 101	SR 33
I-280		SR 59
I-580		SR 82
I-680		SR 85
I-880		SR 99
		SR 140
		SR 152
		SR 237

The No Project Alternative includes this existing highway system, as well as funded and programmed improvements on the intercity highway network based on financially constrained RTPs developed by regional transportation planning agencies. Intercity highway improvements included as part of the No Project Alternative include infrastructure projects, as well as Intelligent Transportation System (ITS) and other potential system improvements programmed to be in operation by 2035. The improvements consist primarily of individual interchange improvements and roadway widening projects on limited segments of the highway network.

3.1.2 AVIATION ELEMENT

The existing air transportation system evaluated under the No Project Alternative consists of two airports that provide commercial service in the area proposed to be served by the San Jose to Merced Section. The airports do not necessarily provide commercial service between the same intercity markets as the proposed HST system. The two primary commercial airports serving the study area are the Norman Y. Mineta San Jose International Airport (SJC) and Merced Municipal/Macready Field (MCE).

Commercial service at the San Jose International Airport currently includes an average of 53 flights per day (7 days a week) to and from Southern California (Los Angeles, Orange County, Burbank, Ontario, Long Beach, and San Diego) and includes one round trip per day to Sacramento Airport. Commercial service at Merced Municipal/Macready Field currently includes three daily and two weekend round trips from Merced to Ontario Airport, where connections can be made to other destinations.

The Airport Master Plan for the San Jose International Airport (City of San Jose Airport Department; July 2006), consists of a program of facility improvements designed to fully accommodate commercial aviation demand (passengers and cargo) projected for the year 2017. The Airport Master Plan has been in implementation since the late nineties. While some of the improvements are already in place, some are under construction and a few that are currently unfunded may be implemented in the future. Two new runways (each 11,000 feet in length) have been constructed. Other key elements of this Plan include up to 49 air carrier gates. Annual aircraft operations would increase from approximately 193,975 in 2005 to about 330,000 in 2017. Annual passengers could grow from 10.7 million annual passengers in 2005 to a projected demand of 17.6 million annual passengers in 2017. In 2005, terminal buildings accounted for approximately 482,000 square feet of space which is projected to increase to approximately 1,700,000 square feet by 2017. These improvements would entail the addition of about 9,300 public parking spaces. The Airport Master Plan is presently being updated and the revised version is expected to be released in July 2010.

For Merced Municipal/Macready Field, improvement plans are documented in the 2007 Merced Municipal Airport Master Plan (Merced Municipal Airport, 2007). Commercial service could increase moderately under this plan, with a baseline projection that would increase annual aircraft operations from 2,700 in 2004 to more than 9,000 in 2026. Under this growth scenario, annual passengers could grow to 53,000 annual passengers. The primary facility improvement recommended in the plan, and included in the No Project Alternative, is a new 11,000-square-feet passenger terminal that is projected to be completed by 2011.

3.1.3 CONVENTIONAL PASSENGER RAIL ELEMENT

Existing intercity passenger rail service in California is provided by Amtrak on four principal corridors covering more than 1,300 linear miles and spanning almost the entire state. The existing passenger rail network in the San Jose to Merced Section study area includes two of these corridors, the San Joaquin Route, which follows the BNSF corridor through the study area and the Coast Starlight, which follows the UPRR from San Jose to Gilroy (as part of its West Coast run from Seattle to Los Angeles, via Sacramento and the Bay Area). While the Coast Starlight passes through the study area, it does not stop in Gilroy.

The San Joaquin Amtrak Route includes two trips daily in each direction from Sacramento to Bakersfield, for a total of six daily roundtrips serving Merced. The intercity route carried over 819,000 riders in 2007 with an on-time performance of 67.9 percent. The scheduled running time between Bakersfield and Oakland averages 6 hours 9 minutes, at an average speed of 51.3 miles per hour. The maximum speed on the route is 79 mph (California Department of Transportation, 2008).

The California State Rail Plan 2007/8–2017/18 (California Department of Transportation, 2008) envisions an increase in service to eight daily roundtrips by 2018, carrying 1,430,000 annual riders, with 90 percent on-time performance and seeks to reduce the travel time from Bakersfield to Oakland to less than six (6) hours.

The San Joaquin Amtrak Route rail corridor currently shares track with the BNSF freight line in the San Jose to Merced Section study area. There are existing Amtrak stations in Merced and Madera. This corridor serves a portion of the same intercity markets as the proposed San Jose to Merced Section alternatives.

Intercity passenger rail system improvements identified in the STIP and the Caltrans California State Rail Plan for implementation before 2020 are included in the No Project Alternative and identified in Table 3.1-2. To increase levels of passenger service, the improvements consist of additional track capacity, new rolling stock, grade-crossing improvements, track and signal improvements, and expanded or upgraded passenger stations.

Table 3.1-2: Programmed Improvements in 2008 California State Rail Plan

Project Title	Route	Lead Agency	Project Description
Madera Station	San Joaquin	Caltrans	Construct new station
Merced Crossover	San Joaquin	Caltrans	Construct crossover – increases efficiency
Merced to Le Grand	San Joaquin	Caltrans	Improvements to increase on-time performance and efficiency
Equipment	San Joaquin	Caltrans	2 train sets (6 cars – 1 locomotive)
Second Track	Caltrain	VTA	Second track Lick - Morgan Hill

Source: California State Rail Plan 2007/8 – 2017/18, California Department of Transportation, 2008.

The Caltrain regional rail service runs from San Francisco to Gilroy, via San Jose. The majority of the service is between San Francisco and San Jose. All trains run as far south as San Jose Diridon Station, with about half the service also serving the Tamien Station. Three peak hours trains run north from Gilroy in the AM peak, stopping at the San Martin, Morgan Hill, Blossom Hill and Capitol stations south of San Jose, with the same stations served southbound in the PM peak. These trains would connect with the proposed HST service at either the Diridon Station in San Jose or Gilroy Station.

Caltrain plans to construct two new fully-equipped boarding platforms on the west side of the current platform area, with completion planned for 2011. The trackwork in and out of the platform area would be reconstructed for all platforms, allowing quicker train movement in and out of the terminal. This project would benefit not only Caltrain, but also ACE, Capitol Corridor, Amtrak's Coast Starlight and Union Pacific freight trains.

The Transportation Agency of Monterey County (TAMC) is planning an extension of rail services into Santa Cruz and Monterey Counties from the Bay Area, stopping in Watsonville (Pajaro), Castroville and Salinas, starting sometime in 2013. Initially envisioned as an extension of Caltrain's Gilroy service, an extension of the Capitol Corridor is also under consideration. Either option would serve San Jose and the same stations from Gilroy to Salinas.

3.1.4 TRANSIT ELEMENT

Transit in the San Jose to Merced HST corridor is primarily focused on the Diridon San Jose Station, with less extensive services at the Gilroy Caltrain Station and the Merced Transit Center, adjacent to the historic Southern Pacific Depot and proposed HST station in downtown Merced.

The Diridon San Jose Station is the Bay Area's southern hub for rail and bus service. It is a stop for every Caltrain train, local and express, providing connections north up the San Francisco Peninsula all the way to San Francisco and south to Morgan Hill and Gilroy. It is the southern terminal for the Altamont Commuter Express (ACE) trains that serve stations in Santa Clara, Fremont, Pleasanton, Livermore, Tracy, Lathrop and Stockton. It is also the terminal for seven roundtrips of the Capitol Corridor trains that serve the East Bay and I-80 corridor as far as Sacramento and Auburn. Santa Clara County's light rail system's Mountain View-Winchester line serves the station, as well as ten of the Valley Transportation Authority's (VTA) bus lines. Other connecting bus services include lines to Santa Cruz, Monterey/Salinas, and Amtrak buses connecting to San Joaquin trains in the Central Valley and Pacific Surfliner trains in San Luis Obispo.

The Gilroy Caltrain Station is served by three Caltrain roundtrips on weekdays. Three trains leave in the morning, making the trip to San Jose, the peninsula and San Francisco, and return in the evening. Five VTA bus lines serve the station, including Line 68, which provides local service between Diridon San Jose Station, Morgan Hill and Gilroy. Regional buses to San Benito and Monterey and Salinas, as well as Greyhound, also serve the station.

The Merced Transit Center, adjacent to the former Southern Pacific Station and proposed Merced HST station, provides local and regional connections from Downtown to the Merced Airport, Merced College, UC Merced, the Amtrak Station, Castle Commerce Center, Merced Mall, and other shopping center destinations in the city. The bus transit system also provides services to the surrounding cities and areas in Merced County, including the communities of Atwater, Livingston, Delhi, Turlock, Hilmar, Le Grand, Planada, Dos Palos, and Los Banos.

Proposed transit services in the study area include the extension of four additional Capitol Corridor round trips to Diridon San Jose Station and an extension of the Bay Area Rapid Transit (BART) system from Fremont to Santa Clara, via Diridon San Jose Station. The additional Capitol Corridor trips are envisioned to begin around 2015. The BART Silicon Valley project is scheduled to begin construction on its first phase in late 2011, with further construction to downtown San Jose, Diridon San Jose Station and Santa Clara not yet determined.

3.1.5 RELATED STUDIES

Provision of increased passenger service between the Bay Area and Southern California along the Coast Corridor has been under study since the passage of Assembly Resolution 39 in 1992. This service is currently under study by the Coast Rail Coordinating Council (CRCC). The proposed "Coast Daylight" would run southbound through the area (between San Jose and Gilroy) in the AM peak and northbound in the PM peak, with stops in both San Jose and Gilroy. No start-up date has been (as of May 2010) identified for this service.

3.2 Program Level Alternatives

Since 1994, three planning and feasibility studies, a statewide program EIR/EIS and a Bay Area to Central Valley Program EIR/EIS have been completed under the direction of the former California Intercity High Speed Rail Commission (Commission), the Authority, and the California Department of Transportation (Caltrans). Results from these prior studies have been summarized below in sections 3.2.1 through 3.2.5.

3.2.1 CALIFORNIA HIGH-SPEED TRAIN PLANNING AND FEASIBILITY STUDIES, 1994–2000

Efforts to consider potential impacts on the environment from a proposed HST system began as early as 1994 by the High-Speed Rail Commission. The Authority started its environmental effort in 1998 with feasibility studies and community outreach to identify a wide range of technology and corridor alternatives to meet intercity travel needs linking major metropolitan areas in California. As stated above, three planning and feasibility studies were completed between 1994 and 2000.

The specific scopes of work of the feasibility studies differed, but they all focused on identifying potential HST technologies and corridors and broadly evaluated their feasibility. The three feasibility studies culminated in the Authority's final business plan (Business Plan) for an economically viable HST system that would serve major metropolitan areas of California (California High-Speed Rail Authority 2000). Also, in 1997, the FRA published High-Speed Ground Transportation for America, a national study examining the commercial feasibility of new high-speed ground transportation systems (Federal Railroad Administration 1997). This commercial feasibility study uniformly applied economic principles to weigh likely investment needs, operating performance, and social benefits of different types of train services in regional travel markets. The Authority applied these principles and in the Business Plan defined a practical approach to construct, operate, and finance an HST system that would yield solid financial returns to the state and provide potentially dramatic transportation benefits to all Californians.

These studies considered environmental constraints and potential impacts, with the objective of avoiding or minimizing impacts on sensitive resources where possible. Most of the study corridors considered follow existing highways or railroad lines, particularly in urban areas, to avoid or minimize environmental impacts. Many of the alignments for corridor and station locations emerged from regional and local agency input. Potential station locations were identified for operational and ridership forecasting purposes, and alternative sites were considered as part of the corridor evaluation; however, specific station sites were not selected. The studies were consecutive such that each subsequent study benefited from and built on previous work to further refine and develop potential HST options.

One of the three studies discussed above, the Corridor Evaluation and Environmental Constraints Analysis was conducted by the Intercity High Speed Ground Transportation Commission (Commission) in three phases and was completed in 1996. The first phase defined the three most promising corridor alignments for linking the San Francisco Bay Area and Los Angeles namely, the Coastal Corridor, Interstate 5 Corridor and the Panoche Pass or Central Valley to Bay Area Corridor. During the second phase, these alternative corridors between Los Angeles and the Bay Area were examined in more detail. The third phase examined potential HST system extensions to Sacramento, San Bernardino/Riverside, Orange County, and San Diego.

The Authority was legislatively mandated to move forward in a manner that was consistent with and continued the work of the Commission. In September 1998, the Authority initiated the High-Speed Rail Corridor Evaluation Study to evaluate the viability of various corridors throughout the state for a statewide HST system. New issues were identified in this study as regional and local agencies provided their input on the recommendations of the previous studies.

Based on these technical studies, the following HST alternatives were eliminated from further consideration during the alternatives screening process:

- Coastal Corridor (San Jose to Los Angeles) and
- Panoche Pass (Central Valley to Bay Area)

According to the Corridor Evaluation and Environmental Constraints Analysis (1996), **the Coastal Corridor** was not a reasonable HST route because its challenging topography resulted in a longer and slower route with higher capital costs. This corridor also had a higher potential for environmental impacts than other HST alternatives being considered because of the sensitive natural and cultural resources and residential communities in the coastal hills and valleys. In addition, it was found that this corridor would not serve the fast-growing Central Valley cities. The coastal corridor failed to meet the purpose and need and basic objectives of the project because it would not reduce travel times between major intercity travel markets in California. Therefore, it was dismissed from further consideration in the 2005 Final Statewide Program EIR/EIS.

Based on data from the High-Speed Rail Corridor Evaluation Final Report (1999), **the Panoche Pass HST Alternative** was not carried forward for further consideration in the 2005 Final Statewide Program EIR/EIS because it would not meet future intercity travel demand. Further, it did not sufficiently reduce intercity travel times between Sacramento, as well as other northern San Joaquin Valley cities (Merced, Modesto, Stockton), and the Bay Area, and thus did not meet the purpose and need and basic program objectives. The Panoche Pass option was also found to be more costly and less efficient than other potential routes.

For a more detailed explanation of the findings in the technical reports that led to the elimination of the above two HST Alternatives, please refer to the 2005 Final Statewide Program EIR/EIS. A summary of the 2005 Statewide Program EIR/EIS is provided in sections 3.2.2 and 3.2.3.

3.2.2 2005 STATEWIDE PROGRAM EIR/EIS ALTERNATIVES

The Statewide Program EIR/EIS for the California HST was completed in November 2005. The Authority and FRA selected the technology for the HST vehicles and identified potential route and station location options through the program environmental analysis. For a more detailed examination of these issues, refer to the Final Program EIR/EIS for the Proposed California High-Speed Train System.

The Statewide Program EIR/EIS examined three major alternatives for the statewide transportation network:

- No Project Alternative: The state's transportation network as it is today, along with funded projects included in regional transportation plans.
- Modal Alternative: Enhancements to the state's transportation network using existing modes and technologies (mainly expanded airports and highways).
- HST Alternative: A new HST system to connect California's major urban centers.

The HST Alternative was the selected system alternative in the Statewide Program EIR/EIS. The No Project Alternative was not able to provide the needed level of intercity mobility in the future, while the Modal Alternative provided reduced mobility compared to the HST Alternative. In addition, the Modal Alternative would have a higher cost and more substantial environmental impacts than the HST Alternative.

3.2.3 SAN JOSE TO MERCED ROUTING AND STATION ALTERNATIVES

The following alignment and station location options were evaluated for the San Jose to Merced Section in the 2005 Statewide Program EIS/EIR:

- **Alignment Alternatives:**

- Caltrain/Pacheco/Henry Miller Avenue
- Caltrain/Pacheco/Grasslands Ecological Area (GEA) North/Merced
- Merced Southern Alignment (Central Valley Portion of San Jose-Merced section for Diablo Range Direct options)
- Direct Tunnel Alignment (Northern or Southern Connection to Merced)
- Caltrain/Morgan Hill/ Foothill/Pacheco Pass Alignment
- Caltrain/Morgan Hill/ East US-101/Pacheco Pass Alignment

- **Station Location Options:**

- San Jose Diridon
- Morgan Hill (near existing Caltrain Station)
- Gilroy (near existing Caltrain Station)
- Morgan Hill (Foothills)
- Morgan Hill (East of US-101)

Table 3.2-1 lists each of the alignment alternatives and station location options considered in the Statewide Program EIR/EIS and identifies whether they were carried forward for further study or withdrawn from further consideration.

Table 3.2-1: 2005 Program EIR/EIS San Jose to Merced Section Alternatives Considered

Alternatives / Stations	Program EIR/EIS Decision		Reasons for Elimination							
	Carried Forward	Not Carried Forward	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Alignment Eliminated*	Environment	Environmental Concerns
Caltrain/Pacheco/Henry Miller Avenue	X									
Caltrain/Pacheco/Grasslands Ecological Area (GEA) North/Merced	X									
Merced Southern alignment (Central Valley Portion of San Jose-Merced section for Diablo Range Direct options)			X					P	San Luis National Wildlife Refuge impacts	
Direct Tunnel Alignment (Northern or Southern Connection to Merced)			X	P				S	Seismic constraints	
Caltrain/Morgan Hill/ Foothill/ Pacheco Pass Alignment			X	P	P	P		P	Visual, land use	
Caltrain/Morgan Hill/ East US101/Pacheco Pass Alignment			X		P	P				
Station Location: San Jose Diridon	X									
Station Location: Morgan Hill (near existing Caltrain Station)	X									
Station Location: Gilroy (near existing Caltrain Station)	X									
Station Location: Morgan Hill (Foothills)			X			P		P		
Station Location: Morgan Hill (East of US-101)			X			P		P		

Source: Final Statewide Program EIR/EIS for the Proposed California High-Speed Train System, California High-Speed Rail Authority, 2005.

Notes:

Reason: Primary (P) and secondary (S) reasons for elimination.

*Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.

Reasons for eliminating alignment alternatives from further consideration in the San Jose to Merced segment are discussed below.

- **Merced Southern Alignment Alternative (Central Valley portion)** was eliminated from further investigation because of potential environmental impacts. The alignment alternative would pass through approximately 4.4 miles of sensitive wetlands, including the San Luis National Wildlife Refuge. It would also pass through floodplains, farmlands of statewide importance and sensitive habitats.
- **Direct Tunnel Alignment Alternative** would cross three active and potentially active fault areas in a tunnel including the Ortigalita fault, the southern extension of the Greenville fault trend and the Calaveras fault zone. The direct tunnel alignment was likely to cost at least \$3 billion more than the minimize tunnel option that would use a 3.5 percent gradient to minimize tunneling. This higher cost would be due largely to the long tunnel and the high unit cost per mile associated with tunnels that exceed six miles in length. The direct tunnel concept would involve construction of a tunnel that would be among the longest in the world (31 miles) through mixed soil and geology types. The results of the Authority's technical tunnel conference indicated that, while not impossible, a tunnel of this length in California would be extremely expensive to construct, operate and maintain, and would therefore be impracticable.
- **Caltrain/Morgan Hill/Foothill/Pacheco Pass Alignment Alternative** was the least costly of all alignments in this section, primarily due to less tunneling and its shorter length compared to the other Pacheco Pass alignments; however, this alignment would have potentially substantial impacts on sensitive habitat through the foothills and would have high visual impacts. This new transportation corridor through the foothills would not be compatible with existing and planned development; would result in potentially severe impacts on the existing suburban, rural and open space areas in the foothills and would provide minimal connectivity and accessibility. It would not link to the Caltrain commuter rail service south of San Jose.
- **Caltrain/Morgan Hill/East 101/Pacheco Pass Alignment Alternative** was similar to the Caltrain/Morgan Hill/Pacheco Pass alignment, with the exception that it would use the US 101 corridor to connect to the Caltrain corridor north of Morgan Hill as opposed to south of Morgan Hill. This alignment alternative would not meet basic program objectives because it would have poor compatibility with development and insufficient connectivity and accessibility. This alternative alignment would not provide a direct link to the Caltrain commuter rail service south of San Jose. This alignment would pass through the longest length of floodplain of all the Pacheco Pass options.

The following station locations were considered and eliminated in the San Jose to Merced Section.

- **Morgan Hill (Foothills):** This potential station site would only serve the Pacheco Pass/Foothills/Morgan Hill/Caltrain alternative that has been eliminated from further investigation. This station location option would have poor connectivity and accessibility and not meet the basic program objectives.
- **Morgan Hill (East of US 101):** This potential station would only serve the Pacheco Pass/East of 101/Caltrain alternative that has been eliminated from further investigation. This station location option would have poor connectivity and accessibility and not meet the basic program objectives.



3.2.4 2008 BAY AREA TO CENTRAL VALLEY PROGRAM EIR/EIS

Following the certification of the statewide program EIR/EIS, the Authority and the Federal Railroad Administration (FRA) defined a broad corridor between the Bay Area and Central Valley for additional review at the program level. Subsequently, the Bay Area to Central Valley Program EIR/EIS for the California HST was completed in May 2008. The 2008 Bay Area to Central Valley Program EIR/EIS further examined this broad corridor as the next phase of the tiered environmental review process.

The Authority and FRA identified potential route and station location options connecting the Bay Area to the Central Valley through this program environmental analysis. For a more detailed examination of these issues, refer to the Bay Area to Central Valley HST Final Program EIR/EIS, May 2008.

The alignment alternatives and station location options evaluated in the Bay Area to Central Valley Program EIR/EIS are shown in Figure 3.2-1. Proposed HST Alignment Alternatives were generally configured along or adjacent to existing rail transportation facilities, instead of creating new transportation corridors. The station location options were spaced approximately 50 mi (80 km) apart in rural areas and 15 mi (24 km) apart in the metropolitan areas.

To facilitate this analysis, the study area was divided into six corridors within the study region.

- San Francisco to San Jose
- Oakland to San Jose
- San Jose to Central Valley
- East Bay to Central Valley
- San Francisco Bay Crossings
- Central Valley Alignment

Alignment Alternatives and station location options within these corridors are identified below.

San Francisco to San Jose Alignment Alternatives

- Caltrain Alignment (Shared-Use Four-Track): From San Francisco, this alignment alternative would follow south along the Caltrain rail alignment to Dumbarton and from there to San Jose. This alignment alternative assumes that the HST system would share tracks with Caltrain commuter trains. The entire alignment would be grade separated. Station location options would include a station in the lower level of the proposed new Transbay Transit Center in San Francisco or a station at 4th and King Streets, a station in Millbrae to serve SFO, and a station in either Redwood City or Palo Alto. The Caltrain shared-use alignment would take advantage of the existing rail infrastructure and would be mostly at-grade.

Station Location Options

San Francisco

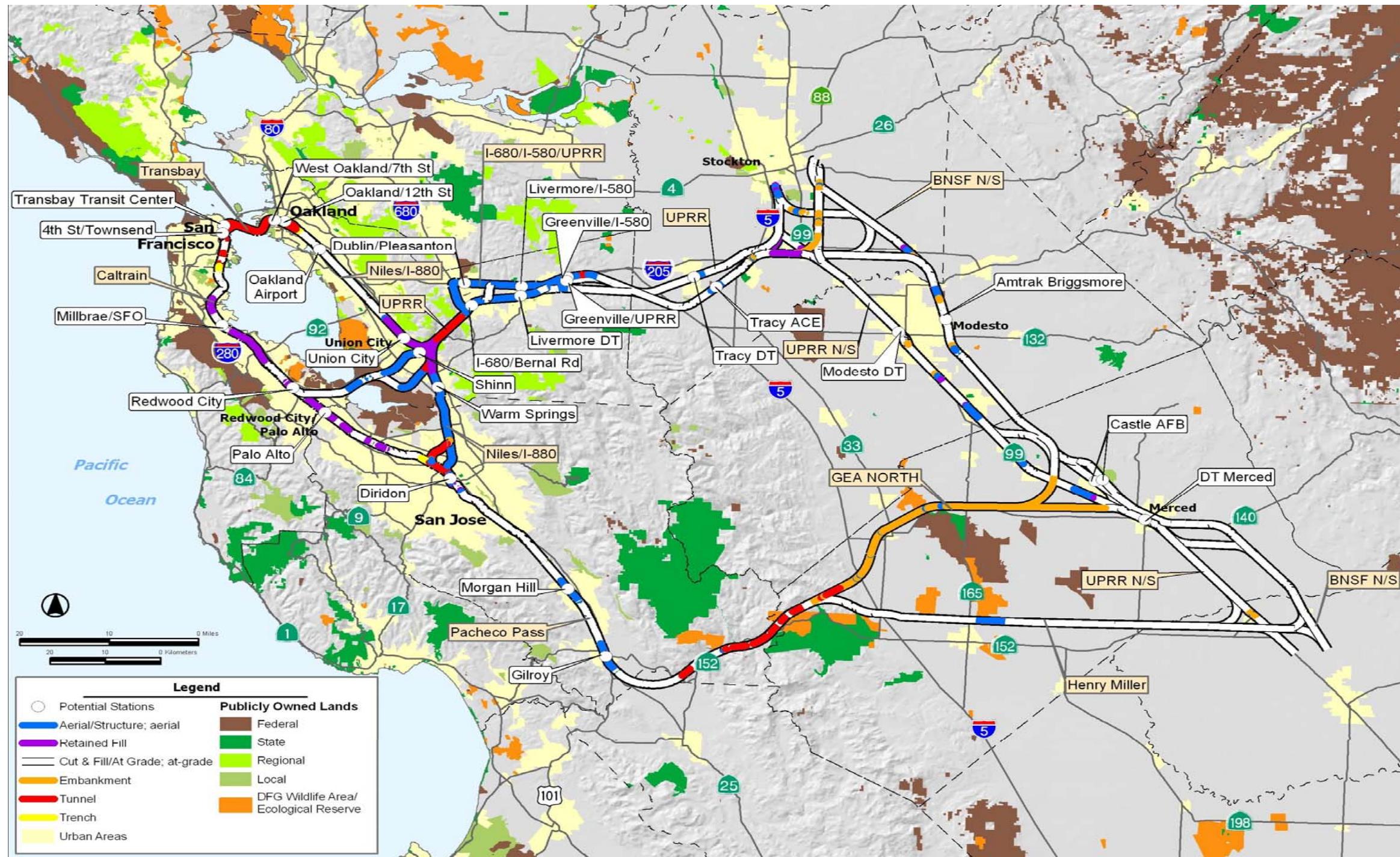
- Transbay Transit Center: This potential station location would serve the Caltrain shared-use alignment as a downtown terminal station.
- 4th and King (Caltrain): This potential station location would serve the Caltrain shared-use four-track alignment as a downtown terminal station.

San Francisco International Airport Millbrae: This potential station would serve as a connection with SFO.

Mid-Peninsula

- Redwood City (Caltrain): This potential station location would provide accessibility and serve the population between San Jose and San Francisco.
- Palo Alto (Caltrain): This potential station location would provide accessibility and serve the population between San Jose and San Francisco.

Figure 3.2-1: Alignment Alternatives and Station Location Options in the Bay Area to Central Valley Program EIR/EIS



Oakland to San Jose Alignment Alternatives

- Niles Subdivision Line to I-880 (Niles/I-880): From Oakland, this alignment alternative would travel south following the UPRR's Niles Subdivision Line (i.e., Hayward Line) transition to the UPRR's Warm Springs Subdivision (Milpitas Line) at Niles Junction and then transition to the I-880. Station location options include Oakland, Oakland Airport and Union City (BART) or Fremont (Warm Springs).
- Niles Subdivision Line to I-880 to Trimble Road (Niles/I-880/Trimble Rd.): From Oakland, this alignment alternative would travel south following the UPRR's Niles Subdivision Line (i.e., Hayward Line), transition to the UPRR's Warm Springs Subdivision (Milpitas Line) at Niles Junction and then transition to I-880 and then to Trimble Road. Station location options include Oakland, Oakland Airport, and Union City (BART) or Fremont (Warm Springs).

Station Location Options

Oakland

- West Oakland: This potential station location would serve Oakland the Niles/I-880 Alignment.
- 12th Street/City Center: This potential station location would serve Oakland from the Niles/I-880 Alignment
- Oakland International Airport*
- Coliseum/Airport BART Station: This potential station location would serve the Oakland Airport from the Niles/I-880 Line.

Southern Alameda County

- Union City (BART): This potential station location would serve the population centers between Oakland and San Jose from the Niles/ I-880 Line.
- Fremont (Warm Springs): This potential station location would serve the population centers between Oakland and San Jose from the Niles/ I-880 Line.

San Jose to Central Valley Alignment Alternatives

Pacheco Pass Alignments

- Caltrain/Pacheco/Henry Miller Avenue: This alignment alternative would extend south along the Caltrain/UPRR rail corridor through the Pacheco Pass and a portion of the GEA along Henry Miller Road and then across the San Joaquin Valley. Station location options include the existing San Jose (Diridon) Station and Gilroy (near the existing Caltrain Station) or Morgan Hill (near the existing Caltrain Station).
- Caltrain/Pacheco/GEA North/Merced: This alignment alternative would extend south along the Caltrain/UPRR rail corridor through the Pacheco Pass, pass through the northern portion of the GEA and then across the San Joaquin Valley. Station location options include the existing San Jose (Diridon) Station and Morgan Hill (near the existing Caltrain Station) or Gilroy (near the existing Caltrain Station).

Station Location Options

San Jose

- San Jose (Diridon): This potential station location would serve all alignments (Caltrain/Monterey Highway rights-of-way) out of San Jose.

South Santa Clara County

- Morgan Hill (Caltrain): This potential station location would serve all the Pacheco Pass alignment alternatives.
- Gilroy (Caltrain): This potential station location would serve all the Pacheco Pass alignment alternatives.

East Bay to Central Valley Alignment Alternatives

Altamont Pass

- UPRR: This alignment alternative would extend east via a relatively direct routing (mostly in tunnel) between Niles Junction and I-680 then use the UPRR alignment through Pleasanton and Livermore before transitioning to the I-580 corridor through the Altamont Pass to Tracy. Station location options include the Pleasanton (Bernal/I-680) Station, Livermore (near downtown), or Livermore (Greenville Rd.) and Tracy (downtown) or Tracy (ACE).
- I-580/UPRR: This alignment alternative would extend east via a relatively direct routing (mostly in tunnel) between Niles Junction and I-680 then use the UPRR alignment through Pleasanton before transitioning to the I-580 corridor through Livermore and the Altamont Pass to Tracy. Station location options include the Pleasanton (Bernal/I-680) Station, Livermore (I-580), or Livermore (Greenville Rd.) and Tracy (downtown) or Tracy (ACE).
- I-580/I-680/UPRR: This alignment alternative would extend east via a relatively direct routing (mostly in tunnel) between Niles Junction and I-680 then use the I-680 alignment before transitioning I-580 corridor (at the I-580/I-680 junction). Station location options include the Pleasanton (BART) Station, Livermore (I-580), or Livermore (Greenville Rd.) and Tracy (downtown) or Tracy (ACE).
- Patterson Pass/UPRR: This alignment alternative would extend east via a relatively direct routing (mostly in tunnel) between Niles Junction and I-680 then use the UPRR alignment through Pleasanton and Livermore before transitioning to the I-580 corridor through the Patterson Pass between Livermore and Tracy. Station location options include the Pleasanton (Bernal/I-680) Station, Livermore (near downtown), and Tracy (downtown) or Tracy (ACE).

Station Location Options

Tri-Valley

- Pleasanton (1-680/Bernal Road): This potential station location would serve the Altamont I-580/UPRR alignment alternative and the Altamont UPRR alignment alternative.
- Pleasanton (BART): This potential station location would serve the Altamont I-580/I-680/UPRR alignment alternative.
- Livermore (Downtown): This potential station location would serve the Altamont UPRR alignment alternative.
- Livermore (I-580): This potential station location would serve the Altamont I-580/I-680/UPRR alignment alternative and the Altamont I-580/UPRR alignment alternative.
- Livermore (Greenville Road/UPRR): This potential station location would serve the Altamont UPRR alignment alternative.
- Livermore (Greenville Road/I-580): This potential station location would serve the Altamont I-580/I-680/UPRR alignment alternative and the Altamont I-580/UPRR alignment alternative.

Tracy

- Tracy (Downtown): This potential station location would serve all Altamont Pass alignment alternatives.
- Tracy (ACE): This potential station location would serve all Altamont Pass alignment alternatives.

San Francisco Bay Crossings Alignment Alternatives

- New Transbay Tube: This alignment alternative would connect the Oakland (West Oakland or 12th Street City Center) and San Francisco (Transbay Transit Center or 4th and King) HST stations via a new transbay tube. This alignment alternative could serve either Altamont Pass or Pacheco Pass alignment alternatives.
- Dumbarton Rail Crossing (Centerville): This alignment alternative would serve the Altamont Pass alignment alternatives and link the East Bay to the Peninsula in the vicinity of the existing Dumbarton Rail Bridge. Between Niles Junction and the Dumbarton Bridge, this alignment would use the Centerville rail alignment. Possible designs for this alignment include use of an improved Dumbarton Rail Bridge (low level), a new high-level bridge, and a new transbay tube.
- Dumbarton Rail Crossing (Fremont Central Park): This alignment alternative would serve the Altamont Pass alignment alternatives and link the East Bay to the Peninsula in the vicinity of the existing Dumbarton Rail Bridge. Between Niles Junction and the Dumbarton Bridge, this alignment would use an existing utility alignment and a new alignment through the Don Edwards Natural Wildlife Refuge. This alignment would require tunneling under Fremont Central Park. Possible designs for this alignment include use of an improved Dumbarton Rail Bridge (low level), a new high-level bridge, and a new transbay tube.

Station Location Options

Southern Alameda County

- Union City (Shinn): This potential station would serve the population centers between Oakland and San Jose only for Altamont Pass (East Bay to Central Valley) alignment alternatives using the Dumbarton Rail Crossing (Centerville) connection to the San Francisco Peninsula.

Central Valley Alignment Alternatives

- BNSF Rail Line: This alignment alternative would connect with either the Altamont or Pacheco Pass alignment alternatives. This north-south alignment would link the Bay Area to Central Valley population centers, Sacramento, and southern California. Station location options include Modesto (Briggsmore) and Merced (Downtown and Castle AFB).
- UPRR Line: This alignment alternative would connect with either the Altamont or Pacheco Pass alignment alternatives. This north-south alignment would link the Bay Area to Central Valley population centers, Sacramento, and southern California. Station location options include Modesto (Downtown) and Merced (Downtown and Castle AFB).

Station Location Options

Modesto

- Downtown Modesto: This potential station location would serve the Altamont Pass and Pacheco Pass alignment alternatives using the UPRR alignment alternative.
- Briggsmore (Amtrak): This potential station location would serve Altamont Pass and Pacheco Pass alignment alternatives using the BNSF alignment alternative.

Merced

- Downtown Merced: This potential station location would serve all Altamont Pass and Pacheco Pass alignment alternatives.
- Castle AFB: This potential station would serve all Altamont Pass and Pacheco Pass alignment alternatives.
 - Livermore (Greenville Road/UPRR)
 - Livermore (Greenville Road/ I-580)
 - Tracy (Downtown)
 - Tracy (ACE)

3.2.5 PREFERRED PROGRAM ALTERNATIVE AND STATION LOCATIONS

The various alignment alternatives in the Bay Area to Central Valley Program EIR/EIS were identified as combining into a total of 21 representative network alternatives, 11 utilizing the Altamont Pass, six utilizing the Pacheco Pass, and four utilizing a combination of the Pacheco Pass with the Altamont Pass (local service). These 21 network alternatives had varying ability to meet the purpose and need for the statewide HST system. In addition, the 21 network alternatives varied in their level, type, and location of environmental impact as well as in the types of constructability challenges involved. The Final Program EIR/EIS recommended as preferred the Pacheco Pass network alternative serving San Francisco via San Jose. In July 2008, the Authority selected the Pacheco Pass to San Francisco via San Jose as the network alternative for connecting the Bay Area with the Central Valley. The selected Pacheco Pass network alternative included general alignments between San Jose and Gilroy, over the Pacheco Pass, across the San Joaquin Valley, and north to Merced, which would be studied further in project EIRs. Due to a recent court ruling, the Authority has reopened the related environmental document and is working to address issues identified by the court as part of a revised and recirculated environmental document. The Authority will consider the revised materials and the entire record before making a new certification decision on the revised program EIR under CEQA. The Authority will also make a new programmatic decision on a network alternative for connecting the Bay Area with the Central Valley that it will study at the project level. The court ruling did not require the Authority to stop the work being done on the project-specific environmental review. The Authority's new decision may result in changes to this or other project-level EIRs. The corridor that is discussed in this project-level alternatives screening document extends approximately 125 miles, starting at the Diridon train station in San Jose, where it connects with the San Francisco to San Jose HST Section, runs south of Gilroy and then east through the mountainous Pacheco Pass to Chowchilla, where it connects with the Merced to Fresno HST Section. Stations are planned in San Jose, Gilroy and Merced.

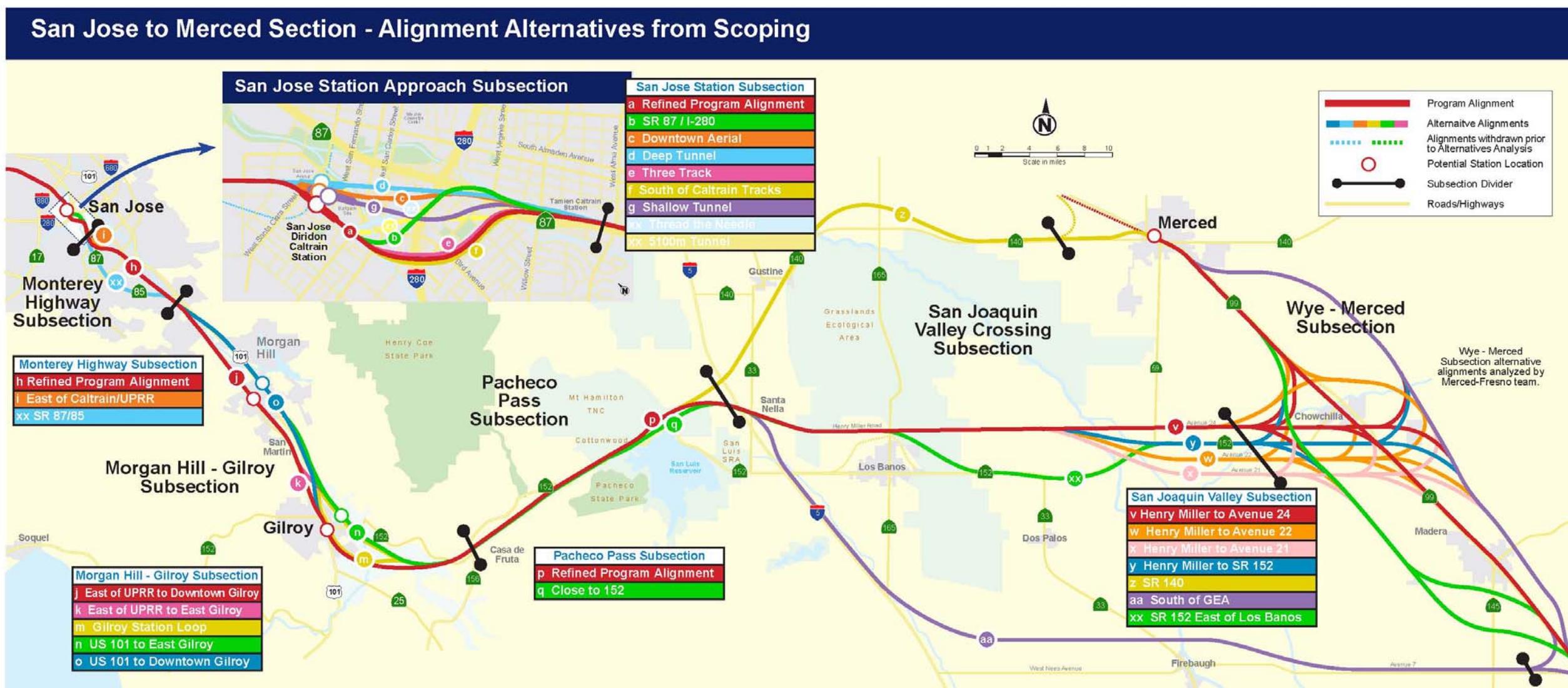
3.3 Initial Development of Project Alternatives

To facilitate the analysis of potential alignment alternatives, station location and design options across the 125 mile San Jose to Merced HST Section, the overall section was divided into six subsections. The approximate geographic limits for each subsection were chosen at points where the HST alignment alternatives for each subsection meet, such that alignment alternatives for each subsection may be "mixed and matched" with those from each adjacent subsection. The subsections, listed north (west) to south (east) are listed below and shown in Figure 3.3-1.

- ◆ San Jose Station Approach: San Jose HST Station to West Alma Avenue (San Jose)
- ◆ Monterey Highway: West Alma Avenue (San Jose) to Coyote–South of Bernal Road (San Jose)
- ◆ Morgan Hill–Gilroy: Coyote–South of Bernal Road (San Jose) to Casa de Fruta (West end of Pacheco Creek Valley)
- ◆ Pacheco Pass: Casa de Fruta (West end of Pacheco Creek Valley) to Interstate 5 (Santa Nella Village)
- ◆ San Joaquin Valley Crossing: Interstate 5 (Santa Nella Village) to Merced/Fresno Wye (Merced or Madera County)
- ◆ Wye to Merced/Fresno Section–Merced: Merced/Fresno Wye (Merced or Madera County) to Merced Station

The description of the alternatives considered for each of the subsections that follow are listed in geographical order, starting at the San Jose HST Station, running through the junction with the Merced to Fresno corridor and ending at the proposed Merced HST Station.

Figure 3.3-1: San Jose to Merced Subsections



3.3.1 SAN JOSE STATION APPROACH SUBSECTION

The San Jose Station Approach Subsection is located between the San Jose HST Station and West Alma Avenue (a distance of approximately two miles), just south of Caltrain's Tamien Station (see Figure 3.3-2). In addition to the Program Alignment, there were eight alignment alternatives for this first two miles of the corridor suggested during and after scoping. These alignment alternatives were developed primarily in response to neighborhood concerns about the effects of adding two tracks for HST to the existing Caltrain right-of-way in the Greater Gardner neighborhood. Additional concerns were the effects of the HST on the planned development in the San Jose/Diridon Station area; constructing HST over an active railroad at the Diridon Station with operations by Caltrain, Union Pacific Railroad (UPRR), Altamont Commuter Express (ACE), Capitol Corridor, and AMTRAK; and provision of a good connection between all existing and planned public transit servicing the San Jose HST Station.

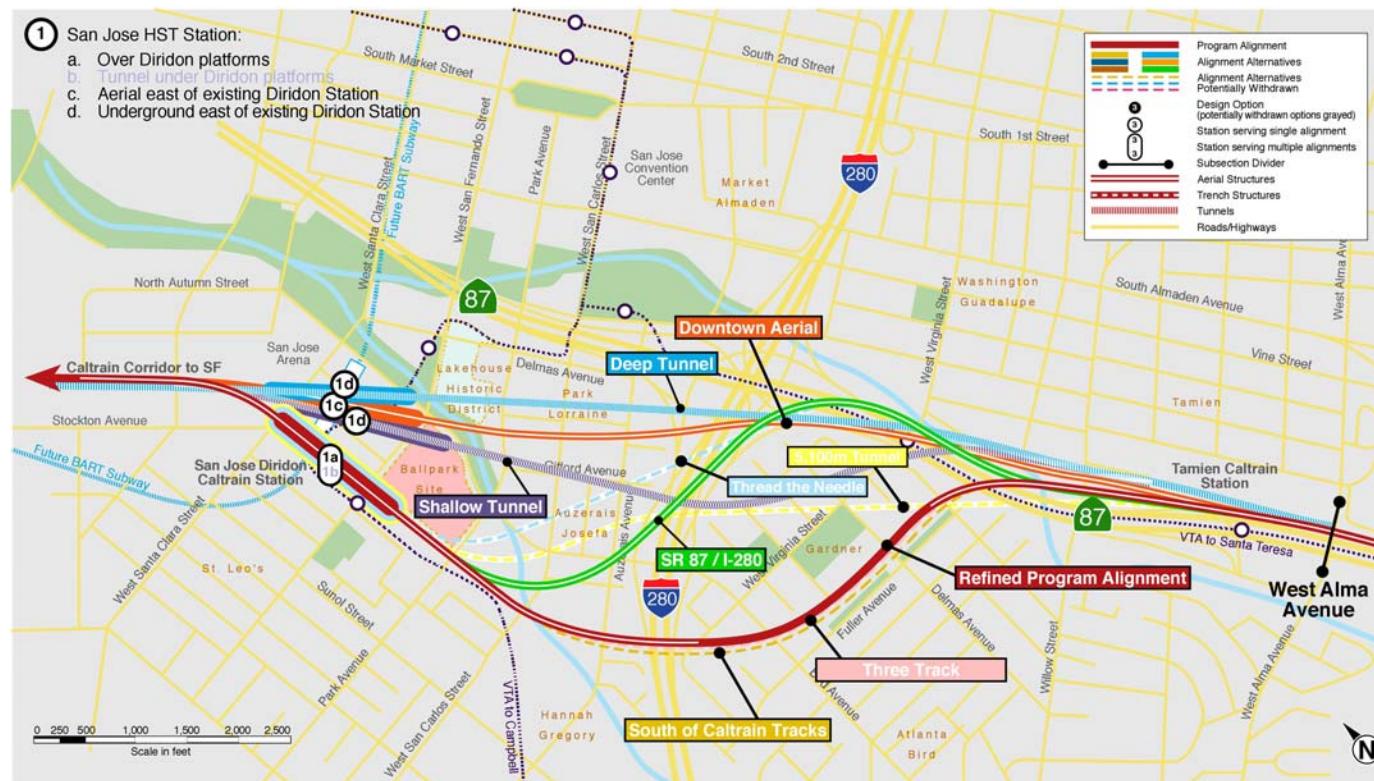


Figure 3.3-2: San Jose Station Approach Subsection

3.3.1.1 Scoping Session Alignment Alternatives

This subsection contains the Program Alignment and eight alignments suggested during and after scoping:

- ◆ Refined Program Alignment
- ◆ South of Caltrain Tracks
- ◆ Three Track
- ◆ Voices of San Jose Thread the Needle
- ◆ Voices of San Jose 5100-Meter Tunnel
- ◆ SR 87/I-280
- ◆ Deep Tunnel
- ◆ Shallow Tunnel
- ◆ Downtown Aerial

Refined Program Alignment

Starting at the south end of the platforms at the San Jose HST Station, at Park Avenue, there would be four elevated tracks departing the station. They would run on an aerial structure approximately 45 feet (14 meters) high above the existing Caltrain/UPRR railroad tracks. The Authority standards call for a 6,000-foot long pair of platform tracks to serve trains diverging from the mainline at intermediate stations¹. This station configuration allows express trains to pass through the station without slowing, while trains stopping at the station can move off the main line tracks to stop at the station platforms. However, in the case of the San Jose HST station, the approaching alignment restricts the speed of the trains which permits the use of shorter platform tracks. The four-track section to the south of the station would extend to just north of San Carlos Street.

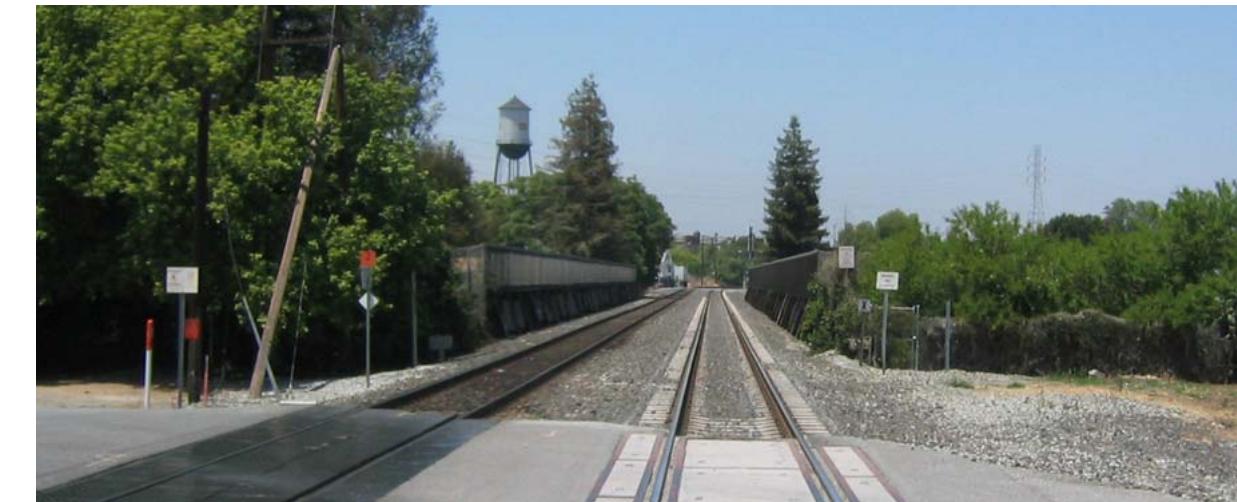


Figure 3.3-3: Existing Caltrain/UPRR at West Virginia Street

South of West Virginia Street, which is south of the Interstate 280 (I-280) freeway (see Figure 3.3-3) the tracks would come down to the same grade as the existing Caltrain/UPRR tracks on the south (west) side of the existing tracks. While the high-speed railway would pass over West San Carlos Street and the existing grade crossing at Auzerais Avenue, it would impact the West Virginia Street crossing. There are three design options being considered to mitigate impacts to this crossing. It could be closed, grade-separated over or under the tracks, or a replacement access street could be developed to serve the neighborhood west of the tracks.

The two high-speed tracks would run at the same grade as the two Caltrain/UPRR tracks through the Greater Gardner neighborhood (see Figure 3.3-4) on the south (west) side. The right-of-way is generally wide enough to accommodate the HST and Caltrain/UPRR, but the existing elevated berm would need to be widened, a retaining wall installed, and the existing tracks moved to the north (east) slightly to provide the necessary space for the HST tracks. In some locations, the right-of-way would need to be expanded, requiring acquisition of some properties.

As the tracks cross over SR 87, the two high-speed tracks would ascend to an elevated structure placed between the existing tracks and State Route (SR) 87, near and above an existing bicycle path.

¹ Stations that are not at the end of the HST line are called "intermediate" stations.



Figure 3.3-4: Caltrain/UPRR through Greater Gardner Neighborhood

South of Caltrain Tracks

This alignment alternative is the same as the Refined Program Alignment alternative with the exception that the HST tracks would be to the south of the existing Caltrain/UPRR tracks through the Greater Gardner neighborhood and not relocate the existing tracks. The approximate limits of this would be from West Virginia Street to the SR 87 overhead.

Three Track

This alignment alternative is the same as the Refined Program alignment alternative with the exception that Caltrain and UPRR would share one track through the Greater Gardner neighborhood. This would enable the two HST tracks to be located completely within the existing Caltrain right-of-way, to eliminate the need for property acquisition of right-of-way. The approximate limits of this would be from West Virginia Street to the SR 87 overhead (see Figure 3.3-2).

Voices of San Jose Thread the Needle

Thread the Needle (see Figure 3.3-5) was proposed by the Voices of San Jose, a not-for-profit public policy group working with the residents of the Greater Gardner and North Willow Glen neighborhoods. It assumed an underground HST station beneath the existing San Jose/Diridon Station platforms. It would leave the Program Alignment at the south end of the existing platforms at Diridon Station in a tunnel and turn sharply east to pass beneath the intersection of Autumn Street and Park Avenue and then under Los Gatos Creek. It would pass under the Park/Lorraine and Auzerais/Josefa neighborhoods before surfacing under the northbound I-280 to southbound SR 87 connector ramp. The tunnel portal location is indicated in Figure 3.3-5 as "Needle Eye". It would ascend to an aerial structure to pass over SR 87, West Virginia Street and the Guadalupe River and rejoin the Program Alignment near Willow Street.

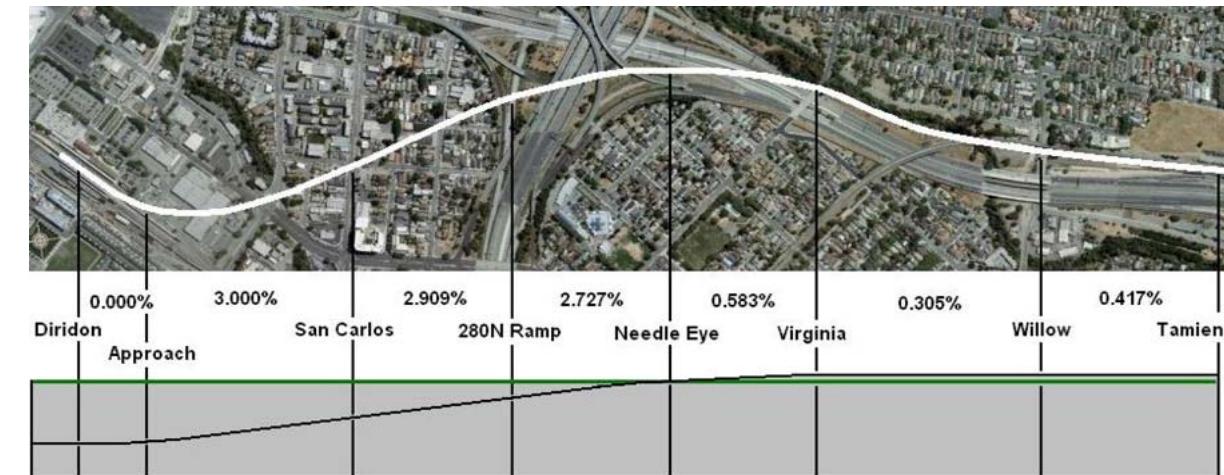


Figure 3.3-5: Voices of San Jose "Thread the Needle" Alignment Alternative

(Image from Voices of San Jose scoping comment letter)

Voices of San Jose 5100-meter Tunnel

Building a 5,100-meter Tunnel (proposed by the Voices of San Jose) is similar to the Thread the Needle alignment alternative, but it would remain in tunnel until well south of the Tamien Station (see Figure 3.3-6). It assumed an underground HST station beneath the existing Diridon Station platforms. It would leave the Program Alignment in a tunnel at the south end of the existing platforms and turn sharply east to pass beneath the intersection of Autumn Street and Park Avenue and then under Los Gatos Creek. It would pass under the Park/Lorraine and Auzerais/Josefa neighborhoods and the I-280/SR 87 interchange. It would then run underground along the Program Alignment, ascending to the surface at a portal along the Caltrain/UPRR near Almaden Expressway.

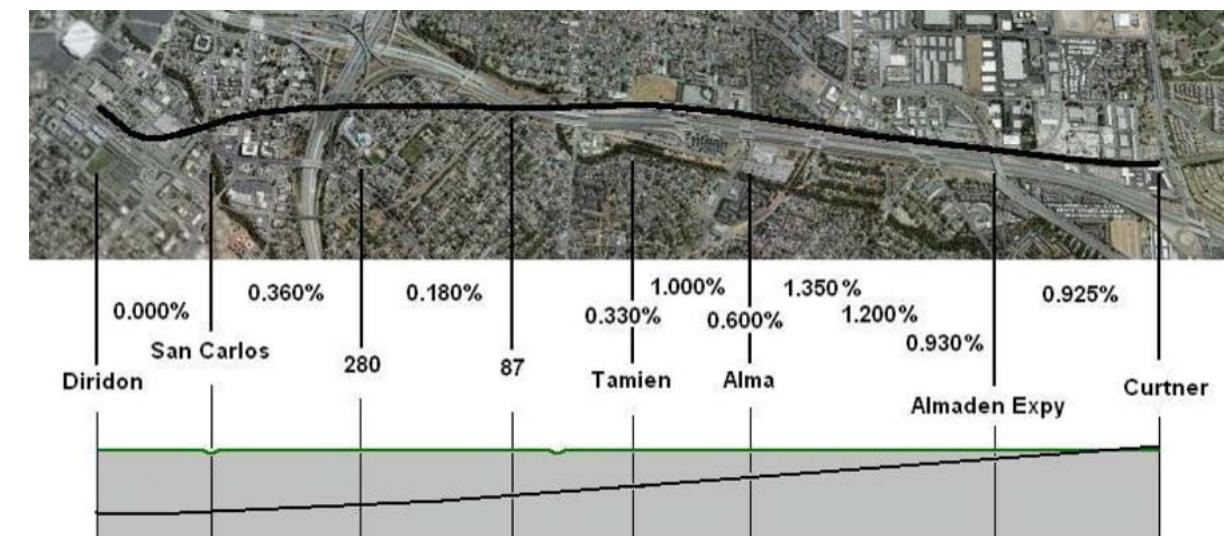


Figure 3.3-6: 5100-meter Tunnel Alignment Alternative

(Image from Voices of San Jose scoping comment letter)

SR 87/I-280

This aerial alignment alternative would turn to the east immediately south of the elevated San Jose HST platforms. It would cross over the intersection of Bird Avenue and Auzerais Avenue and then use the right-of-way of I-280 and SR 87 to bypass the Greater Gardner neighborhood. It would pass over West Virginia Street and descend to join the Program Alignment near Willow Street (see Figure 3.3-7).



Figure 3.3-7: City of San Jose Alignment Alternatives

Due to the complexity of this alignment alternative, additional engineering beyond the two to four percent design development typical in the AA process was performed. Alignment design was iteratively progressed with the design and layout of the proposed viaduct structure. The horizontal alignment also considered the location of the existing SR 87/I-280 interchange ramps and was adjusted to minimize the height of the viaduct crossing through the interchange. Construction access and methodology were carefully considered to meet the requirements of Caltrans in the area of the SR 87/I-280 interchange to provide for a constructible project that minimizes impacts to vehicular traffic. Structural analysis of the viaduct included the use of structural analysis software in order to verify probable member sizes and their feasibility and constructability.

Deep Tunnel

The Deep Tunnel alignment alternative would be a relatively straight alignment from north of the existing Diridon Station to near the Tamien Station (See Figure 3.3-7). It would be constructed by boring (tunneling) the alignment and station beneath existing development, the planned BART Arena/Diridon Station, Los Gatos Creek and the Guadalupe River. This alignment is discussed in depth in the Downtown San Jose Alternatives Report, included as Appendix C.

This alignment alternative would include a new underground HST station to the east of the existing San Jose/Diridon Station, perpendicular to and beneath the planned Diridon/Arena BART station. The tunnel would start near Lenzen Avenue where it would meet the vertical alignment of the San Francisco to San Jose corridor. The San Jose to Merced team has coordinated with the San Francisco to San Jose team to make certain that all combinations of vertical alignment for both sections are compatible.

The horizontal alignment would leave the Caltrain right-of-way at the north limits of the San Jose/Diridon Station and continue straight to an underground station. This station would extend from beneath the San Jose Arena parking lot, past West Santa Clara Street, the planned Diridon/Arena BART station, ending near South Autumn Street. After the station, the tunneled alignment would pass beneath Los Gatos Creek, the Lakehouse and Park/Lorraine neighborhoods, and the I-280/SR 87 interchange. South of the interchange, it would travel beneath the SR 87 freeway and Guadalupe River, ascending back to grade on the east side of the Caltrain/UPRR right of way, just north of West Alma Avenue.

Shallow Tunnel

The Shallow Tunnel alignment alternative would run from north of the existing Diridon Station to near the Tamien Station (See Figure 3.3-2). The alignment is designed to allow for a cut-and-cover station, making construction simpler than if the station was to be bored (tunneled). This alignment is discussed in depth in the Downtown San Jose Alternatives Report, included as Appendix C.

This alignment alternative would include a new underground HST station to the east of the existing San Jose/Diridon Station, perpendicular to the planned Diridon/Arena BART station. The depth of the HST station would require the BART station and alignment to be lowered to place the BART station beneath the HST station. This would affect about 8,000' of the BART alignment, from approximately the intersection of North First Street and East Santa Clara Avenue to the near the intersection of Stockton Avenue and Lenzen Avenue. The horizontal alignment is assumed to remain the same, but the vertical alignment will descend at approximately a 2.5% grade to reach the lowered Diridon/Arena BART station beneath the shallow HST station. The tunnel would start near Lenzen Avenue where it would meet the vertical alignment of the San Francisco to San Jose corridor. The San Jose to Merced team has coordinated with the San Francisco to San Jose team to make certain that all combinations of vertical alignment for both sections are compatible.

The horizontal alignment would leave the Caltrain right-of-way at the north limits of the San Jose/Diridon Station and continue straight to an underground station. This station would extend from just south of West Santa Clara Street to South Autumn Street.

South of the station, the cut-and-cover construction would continue beneath Los Gatos Creek and a portion of the Lakehouse and Park/Lorraine neighborhoods. At San Carlos Street, the construction would change to a bored tunnel to pass beneath the remainder of the Park/Lorraine neighborhood, I-280, the Gardner neighborhood, SR 87 and the Guadalupe River before ascending to grade on the east side of the Caltrain/UPRR railroad, near the Tamien Station.

Downtown Aerial

The Downtown Aerial alignment alternative would begin north of the existing Diridon Station, near Julian Street, where the Program Alignment is on an aerial, four-track configuration. The alignment continues straight as the Caltrain tracks turn to approach the existing San Jose/Diridon Caltrain Station, to align with a new, elevated four-track station that extends from north of West Santa Clara Street to near Park Avenue (see Figure 3.3-8). The elevated platforms would connect to the existing surface station at Diridon via an elevated mezzanine, running perpendicularly from the north end of the existing Diridon Station platforms to beneath the elevated HST platforms. Connection would be made from this mezzanine to the street and proposed transit hub at Diridon Station, including buses and BART. South of the HST station, the aerial alignment would cross above South Autumn Street and Los Gatos Creek and then through the Lakehouse Historic District. It would then continue above a residential/commercial area, just to the east of Gifford Avenue. It then passes over I-280, where the four-track configuration returns to a two-track configuration. It remains aerial over the southbound I-280 to SR 87 connectors, SR 87, West Virginia Street and the Guadalupe River. It would then descend to grade on the east side of the Caltrain/UPRR tracks at the Tamien Caltrain Station.

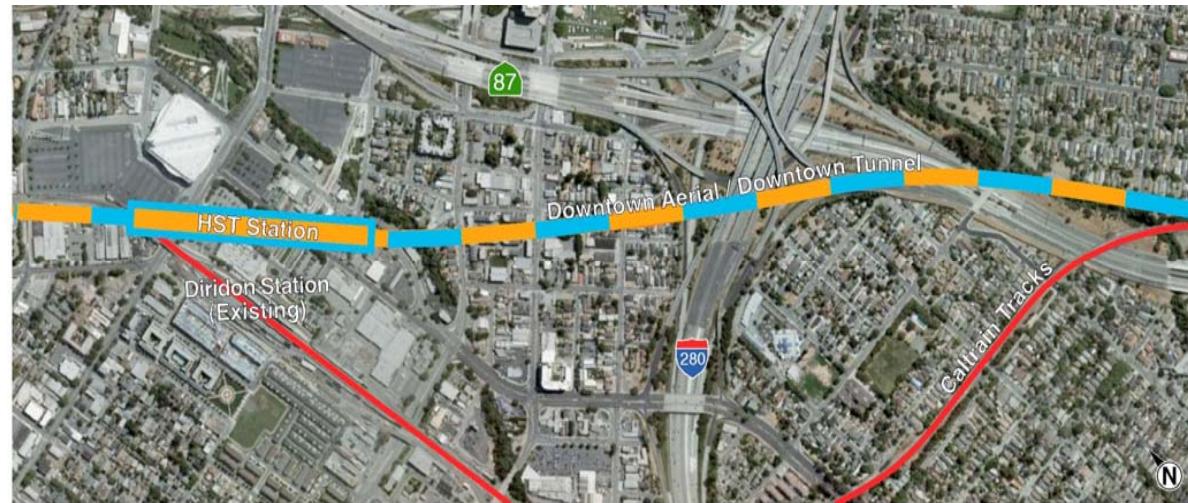


Figure 3.3-8: Downtown Aerial Alignment Alternative and Station Location

3.3.1.2 Alignment Alternatives Withdrawn from Further Consideration

All the alignment alternatives described above were reviewed by the San Jose to Merced Corridor Team and staff from the California High-Speed Rail Authority, Federal Railroad Administration, and the Program Management Team. As a result of this review, the following alignment alternatives were withdrawn from further analysis in the Alternatives Analysis phase.

Voices of San Jose Thread the Needle and 5,100-meter Tunnel

The Voices of San Jose Thread the Needle and 5,100-meter Tunnel alignment alternatives both require sharp curves to enter and exit an underground station beneath the existing Diridon Station. This would reduce train speeds. In addition, the challenges of constructing a new underground train station directly beneath the existing Diridon Station while the existing trains (Caltrain, ACE, Capitol Corridor, AMTRAK, UPRR freight) remain operational were seen as exceedingly complex to construct. Finally, both the Downtown Aerial and Deep Tunnel alignment alternatives avoid the slow through speed and difficult construction conditions of the two Voices of San Jose alignments, while meeting the goal of minimizing disruption on the Greater Gardner neighborhood. These factors were discussed with representatives of the Greater Gardner neighborhood, who agreed that the proposed remaining tunnel would meet their goals.

3.3.2 MONTEREY HIGHWAY SUBSECTION

The Monterey Highway subsection is located between West Alma Avenue, just south of Caltrain's Tamien Station, and Coyote – South of Bernal Road, near SR 85 in south San Jose (see Figure 3.3-9). In addition to the Program Alignment, there were two alignment alternatives suggested during scoping. One alignment alternative was developed primarily in response to neighborhood concerns about the effects of HST in the vicinity of Caltrain Tamien Station. Another alignment alternative proposed that the HST follow the SR 85 and SR 87 freeways instead of the rail corridor.

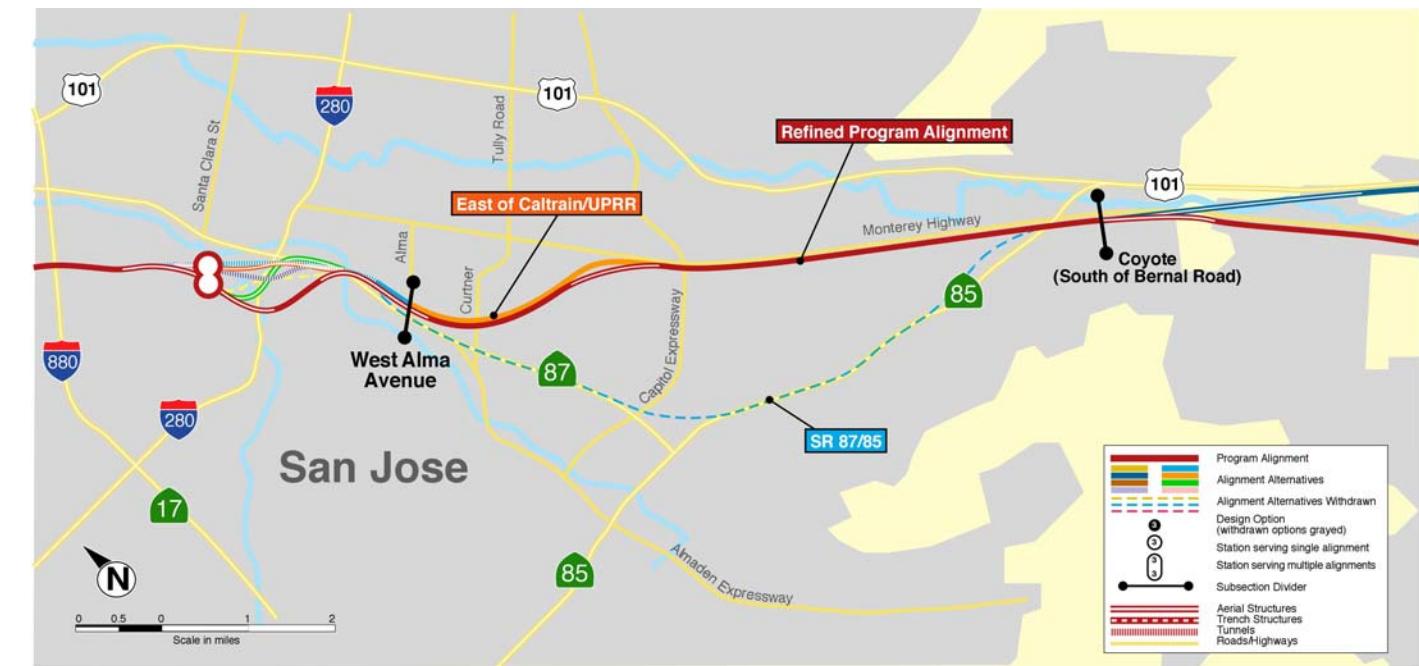


Figure 3.3-9: Monterey Highway Subsection Alignment Alternatives

3.3.2.1 Scoping Session Alignment Alternative Suggestions

This subsection contains the Refined Program Alignment and the two alignments suggested in scoping:

- ♦ Refined Program Alignment
- ♦ East of Caltrain/UPRR
- ♦ SR 87/85

Refined Program Alignment

Starting south of the Tamien Caltrain Station at West Alma Avenue, the HST tracks would be on an elevated structure, between the existing tracks and SR 87, near and above the existing bicycle path. Just north of the Almaden Expressway overcrossing, the HST would descend to run at-grade on the west side of the Caltrain/UPRR tracks. The Caltrain/UPRR tracks would be shifted to the east to accommodate the HST tracks within the existing right-of-way.

South of Curtner Road (see Figure 3.3-10) the HST would continue along the west side of the Caltrain/UPRR tracks, slowly transitioning to outside the existing right-of-way. Caltrain's ownership of the railroad right-of-way ends at Lick, a point near Pullman Way in San Jose. At this location, the high-speed tracks would be outside and adjacent to the UPRR right-of-way, ascending to an aerial structure. To ease the existing railway curve, the HST aerial alignment would fly-over a portion of the quarry and the existing railway spur serving the quarry. It would then pass over the UPRR and descend just north of Capitol Expressway, occupying a portion of the right-of-way of Monterey Highway, to run at-grade between the highway and UPRR. (see Figure 3.3-11)



Figure 3.3-10: Caltrain/UPRR South of Curtner Road Overcrossing



Figure 3.3-12: Monterey Highway and UPRR Near Bernal Road



Figure 3.3-11: UPRR and Monterey Highway at Capitol Expressway

Traveling south along Monterey Highway, some existing overcrossings would need to be modified, and new grade separations built at Skyway Drive, Branham Lane, and Chynoweth Avenue. Pedestrian and bicycle access would need to be provided over or under the HST tracks to the Caltrain platforms at the Capitol and Blossom Hill stations. The existing highway would be reconfigured to accommodate the high-speed railway's two tracks, which would occupy what are now the southbound lanes of the existing roadway. (see Figure 3.3-12). The rebuilt four-lane roadway would occupy the east side of the existing highway right-of-way, with appropriate left-turn lanes, median, bike facilities, sidewalks and landscaping.

East of Caltrain/UPRR

This alignment alternative would connect with San Jose Station Approach subsection alignment alternatives that would pass Caltrain's Tamien Station to the east. This eastern alignment allows a better connection to the tunneled alignment alternatives to the north (see previous section). Beginning south of Caltrain's Tamien station, at West Alma Avenue the HST tracks would be within the existing right-of-way, relocating the existing Caltrain/UPRR tracks to the west. Just south of the Almaden Expressway overcrossing, an existing industrial rail spur extends to the east, intersecting the alignment of the HST. Three options have been identified to eliminate this intersection:

- ◆ An extended aerial HST alignment over Almaden Expressway
- ◆ Place the HST in a trench under the spur
- ◆ Relocate the spur's connection with the Caltrain/UPRR tracks to another location

South of Curtner Road (see Figure 3.3-10) the HST would continue along the east side of the Caltrain/UPRR tracks, slowly transitioning to outside the existing right-of-way. Caltrain's ownership of the railroad right-of-way ends at Lick, a point near Pullman Way in San Jose. At this location, the high-speed tracks would be adjacent to the UPRR right-of-way. After passing through a short stretch of industrial buildings, the high-speed railway would occupy a portion of the right-of-way of Monterey Highway, running at-grade between the highway and UPRR. From this point on, it would be identical to the Refined Program Alignment alternative.



Figure 3.3-13: Alignment Alternatives at Tamien Caltrain Station

SR 87/85

This alignment alternative proposed relocating the Santa Clara Valley Transportation Authority's (VTA) light rail line from the median of the SR 87 and SR 85 freeways and placing it along Monterey Highway and South First Street (see Figure 3.3-9). The HST alignment alternative would depart from the Program Alignment near Willow Street and pass into the median of SR 87. It would follow SR 87 south, ascending to aerial to pass over the northbound lanes north of Capitol Expressway so as to minimize two curves in the freeway, pass over the Branham Lane overcrossing and leave the freeway right-of-way to cross a residential neighborhood, following Gaundabert Lane to avoid the SR 87/SR 85 interchange. It would descend into the median of SR 85 just west of Blossom Hill Road. It would follow the median until Cottle Road where it would ascend to aerial again to cross a business park and swing back to the Program Alignment at Bernal Road.

3.3.2.2 Alignment Alternatives Withdrawn from Further Consideration

All the alignment alternatives described above were reviewed by the San Jose to Merced Corridor Team and the California High-Speed Rail Authority staff, the Federal Railroad Administration staff, and the Program Management Team. As a result of this review, the following alignment alternatives were withdrawn from further analysis in the Alternatives Analysis phase.

SR 87/85

The SR 87/85 alignment alternative does not provide an alignment that meets HST criteria for curve radii. The clearance beneath existing overpasses along SR 87 and SR 85 and is too low to meet HST design standards. The connection between SR 87 and SR 85 would require construction through a residential neighborhood, across from a high school. The relocation of the VTA's light rail would require unidentified funding and study, as it would be eliminating light rail service from an existing 10-mile corridor and replacing it along a new corridor. It would also orphan the VTA Almaden line which branches from the main light rail line near the SR 85-87 interchange. Without light-rail in the SR 85-87 median, there would be no connection from the VTA Almaden line to the rest of the system.

3.3.3 MORGAN HILL – GILROY SUBSECTION

The Morgan Hill - Gilroy subsection is located between Bernal Road, near SR 85 in south San Jose, and Casa de Fruta, at the west end of the Pacheco Creek Valley (see Figure 3.3-14).

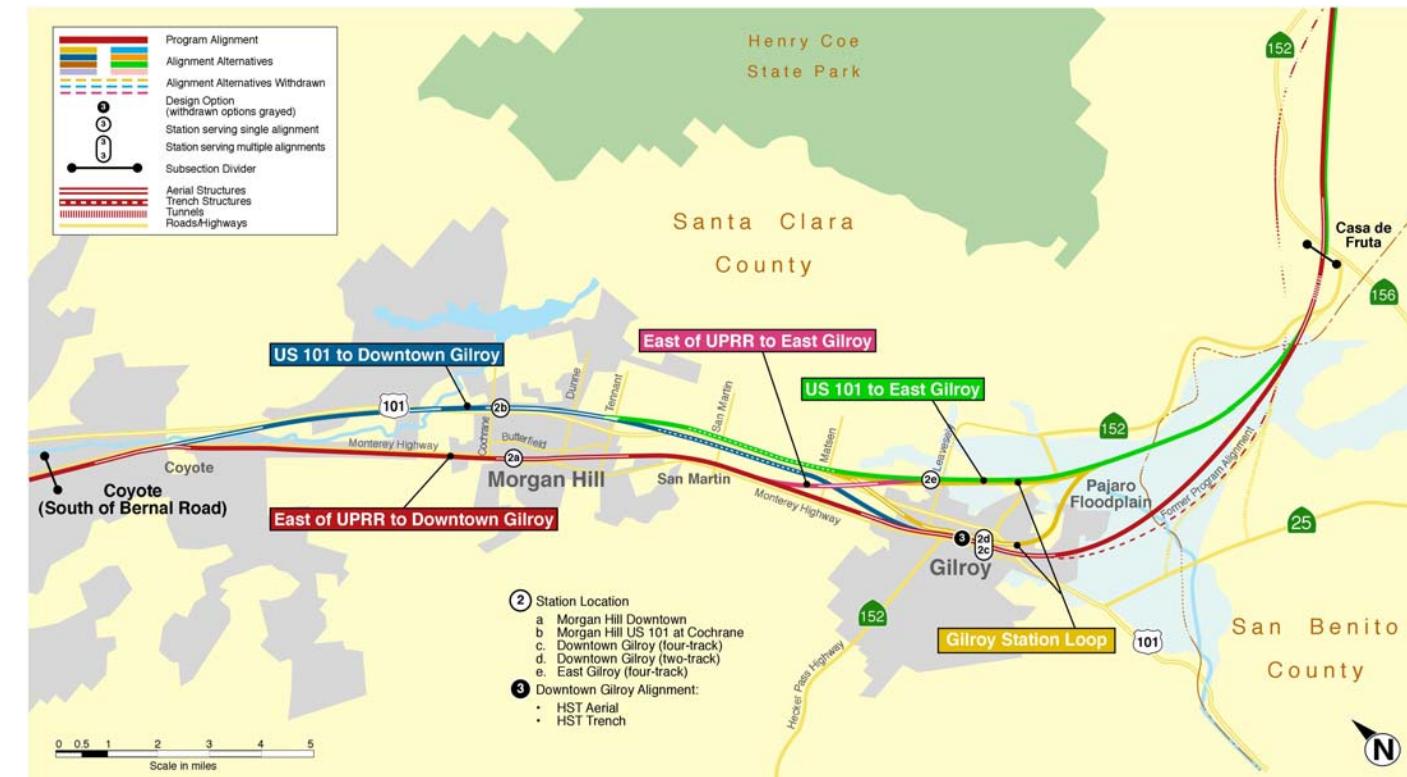


Figure 3.3-14: Morgan Hill - Gilroy Subsection

3.3.3.1 Scoping Session Alignment Alternatives

This subsection contains the Program Alignment and four alignments suggested in scoping:

- ◆ East of UPRR to Downtown Gilroy (Refined Program Alignment)
- ◆ US 101 to Downtown Gilroy
- ◆ Gilroy Station Loop
- ◆ East of UPRR to East Gilroy
- ◆ US 101 to East Gilroy

East of UPRR to Downtown Gilroy (Refined Program Alignment)

At the beginning of the Morgan Hill subsection, the HST would run adjacent to the UPRR right-of-way on the east side, in the vicinity of Bernal Road in South San Jose. Traveling south, the tracks would ascend to an aerial structure which would cross over the southbound lanes of Monterey Highway before entering the median. The aerial alignment stays in the median until Coyote where it then crosses over southbound lanes again before returning to grade between the highway and UPRR near Blanchard Road. This aerial alignment would pass above a well-established wildlife corridor in this area.

As the HST railway runs south of Coyote, new grade separations would be built to carry major streets over the HST, the UPRR and Monterey Highway. The recent grade separation at Bernal Road is a relevant example of the potential design of new grade separations in this subsection. It is also necessary in this area to relocate Monterey Highway to the east to accommodate the HST tracks.

At Cochrane Road in Morgan Hill, Monterey Highway moves away from the UPRR and the HST alignment. High-speed tracks would continue running to the east of the UPRR, gradually ascending to an aerial structure to pass over the existing Morgan Hill Caltrain Station and downtown Morgan Hill cross streets. At this location there is a design option

for an HST station in Morgan Hill. South of Maple Avenue, the high-speed tracks would return to grade, to the east of the UPRR right-of-way.

Running south toward Gilroy, the tracks would be at-grade, with major streets grade separated to cross over or under the HST and the UPRR tracks. Just north of Las Animas Avenue, the HST tracks would ascend to an aerial structure and transition to a four-track configuration as they approach the Gilroy Station. The Gilroy high-speed train station would be built to the east of the existing Caltrain platform and UPRR tracks at the existing Gilroy Caltrain Station (see Figure 3.3-15). The existing commute train storage tracks adjacent to the Caltrain Station would be relocated to south Gilroy.



Figure 3.3-15: Gilroy Caltrain Station

A design option would place the HST in a trench through downtown Gilroy (see Figure 3.3-16). The tracks would descend into the trench north of Leavesley Road. Soon afterwards, the tracks would transition to a four-track configuration approaching the Gilroy Station. The Gilroy high-speed station would be east of the existing Caltrain platform and UPRR at the existing Gilroy Caltrain Station. After passing beneath the existing UPRR industrial lead track south of US 101, the tracks would ascend back to grade.

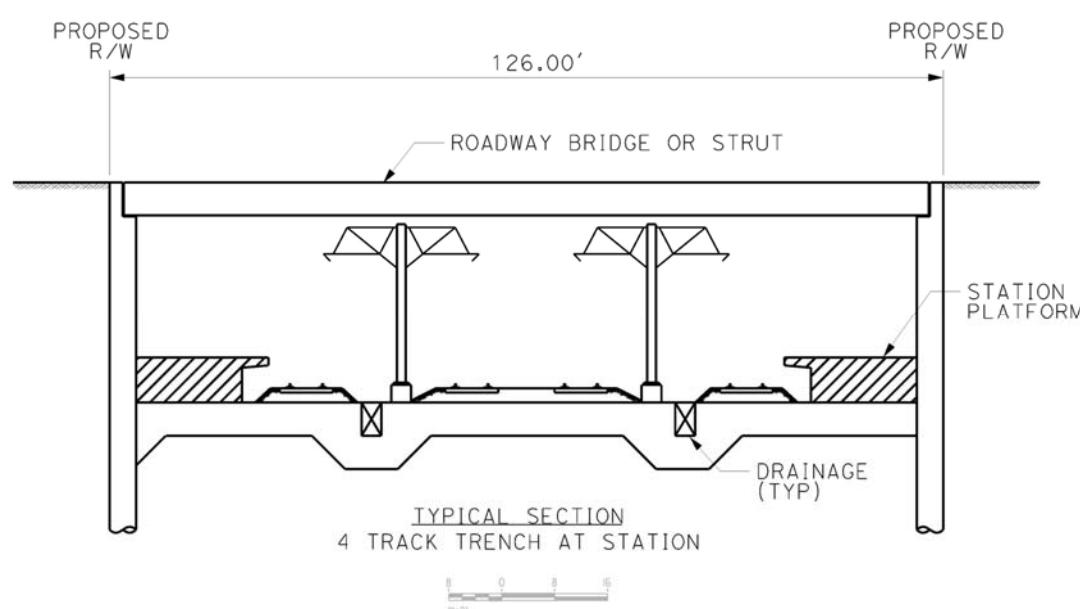


Figure 3.3-16: Gilroy Trench Station

South of the Gilroy Station, the HST alignment alternative would be east of the UPRR right-of-way, returning to a two-track configuration near East Luchessa Avenue. After passing over US 101 and a UPRR industrial lead track, the HST tracks would descend back to an at-grade configuration. The HST tracks remain immediately to the east of the UPRR right-of-way until Carnadero Junction, the location where the Hollister Branch of the UPRR leaves the UPRR Coast Line. In this area, the HST alignment alternative would begin to curve to the east.

The alignment alternative would pass across an agricultural area that is part of a large floodplain for the upper Pajaro River (see Figure 3.3-17). After crossing SR 152 near San Felipe, it would enter a tunnel that brings the line to the Pacheco Creek Valley near Casa de Fruta.

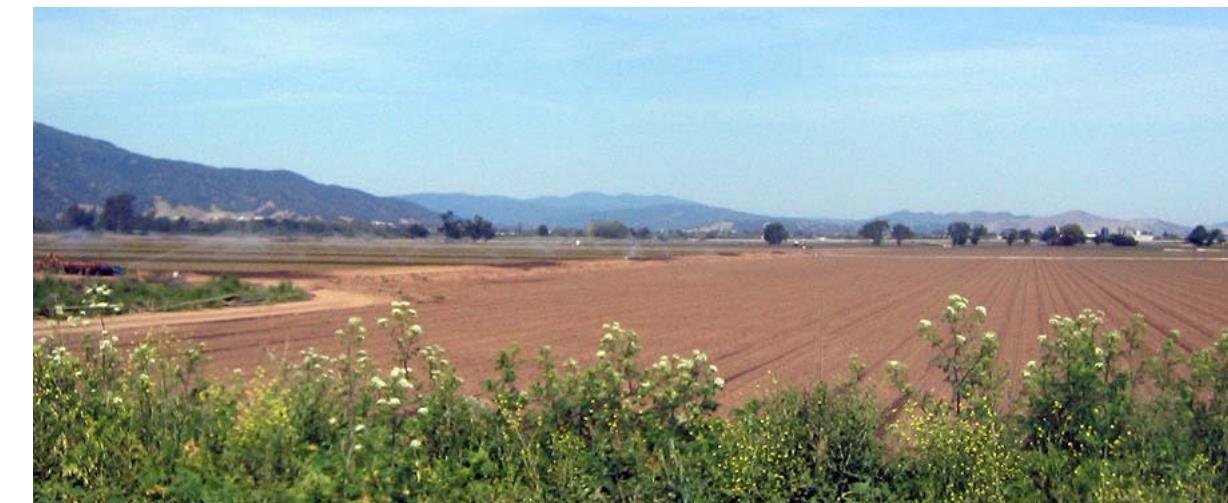


Figure 3.3-17: Santa Clara Valley Southeast of Gilroy

US 101 to East Gilroy

The US 101 alignment alternative would leave the Program Alignment north of Coyote, near Forsum Road (see Figure 3.3-14). It would ascend to an aerial alignment and cross Monterey Highway and Coyote Creek, approaching US 101. It would pass over Bailey Road and descend to run on the west side of the freeway, at-grade. It would ascend to an aerial structure to cross US 101 and Coyote Creek near the northern city limits of Morgan Hill. Continuing on aerial structure, it would run along the east side of US 101, passing over the interchange at Cochrane Road, the East Main Street overcrossing and the East Dunne Avenue interchange. A design option would provide a HST station serving Morgan Hill just south of Cochrane Road.

South of the East Dunne Avenue interchange, the HST would move away from the freeway to run east of Conduit Avenue, passing over the City of Morgan Hill's sports complex and passing east of the US 101/Tenant Avenue interchange. After passing over Tenant Avenue, it would descend back to grade as it curves to align again with the east side of US 101 near East Middle Avenue. From here, it descends into a trench to pass under the East San Martin Avenue interchange. The alignment stays in trench past the South County Airport and under the CHP truck inspection facility, Church Avenue and Masten Avenue interchange, where it curves away from the freeway. After passing beneath Buena Vista Avenue, it ascends back to grade to run towards the Leavesley Road HST station location, approximately 0.5 miles east of US 101 on Leavesley Road.

The Leavesley Road HST station would consist of four tracks. The inner two tracks would be for express HST that would run through the station without stopping. The outer tracks would extend about 3,000 feet in each direction from the station, to allow for stopping trains to brake or accelerate as they exit and rejoin the mainline for the station. The platforms would be about 1,400 feet long. Leavesley Road would be depressed to pass under the tracks just south of the station. Heading south from the station, the HST would curve towards San Felipe, crossing agricultural land that is part of the Pajaro River floodplain, elevated on a short berm above the level of potential floodwaters. Near SR 152 at San Felipe, the HST's embankment would gradually increase as it approaches the hills.

separating the Santa Clara Valley from the Pacheco Creek Valley. After passing over SR 152, the HST would enter a tunnel to bring it to the Pacheco Creek Valley, near Casa de Fruta.

Gilroy Station Loop

The Gilroy Station Loop alignment alternative splits the station tracks in Gilroy from the through express tracks to minimize the right-of-way requirements in the area of the Gilroy HST station (see Figure 3.3-14). The stopping trains would leave the US 101 to East Gilroy alignment alternative near Masten Avenue and join the Program Alignment near Los Animas Avenue. It would proceed along the Program Alignment to the HST station in Gilroy, but as the tracks would only be used by stopping trains, there would only be two tracks in the station. Upon leaving the station, the tracks would curve sharply to the east, passing over US 101 north of Luchessa Avenue to cut quickly back towards the US 101 to East Gilroy alignment, meeting it just past Frazier Lake Road. From there, it follows that alignment alternative, described above, out towards the Pacheco Creek Valley. For through trains, the express tracks would follow the US 101 to East Gilroy alignment alternative for its entire length. At both the north and south junction between the express and station tracks, a grade-separated HST junction would be required.

East of UPRR to East Gilroy

This alignment alternative combines the East of UPRR to Downtown Gilroy and US 101 to East Gilroy alternatives such that the HST would be placed immediately to the east of the UPRR through the Coyote Valley, Morgan Hill and San Martin before crossing over to the US 101 to East Gilroy alignment alternative near Masten Avenue. A station would be provided at Leavesley Road, east of US 101. The HST then would follow the US 101 to East Gilroy alignment alternative to the Pacheco Creek Valley (see Figure 3.3-14).

US 101 to Downtown Gilroy

This alignment alternative combines the US 101 to East Gilroy and East of UPRR to Downtown Gilroy alternatives such that the HST would follow US 101 through Morgan Hill and San Martin and then crosses over toward Downtown Gilroy, including a station in Downtown Gilroy.

It follows the US 101 to East Gilroy alignment until about Maple Avenue in Morgan Hill. Here, it descends into a trench to pass under US 101 to run on the west side of the freeway. It remains in trench under the East San Martin Avenue interchange, past the South County Airport, Church Avenue overcrossing, and Masten Avenue, where it turns away from the freeway. It passes beneath Rucker Avenue and then ascends to grade to join the East of UPRR to Downtown Gilroy alignment near Las Animas Avenue. It runs to a downtown station in Gilroy and then follows the East of UPRR to Downtown Gilroy alignment alternative out towards the Pacheco Creek Valley (see Figure 3.3-14).

No alternatives were withdrawn from consideration in this subsection.

3.3.4 PACHECO PASS SUBSECTION

The Pacheco Pass subsection is located between Casa de Fruta, at the west end of the Pacheco Creek Valley, and Interstate 5 (I-5), west of Santa Nella Village in Merced County. The Pacheco Pass includes steep terrain and narrow valleys and presents major engineering challenges.



Figure 3.3-18: Pacheco Pass Subsection

It was explained to the public during scoping that the "Quantm" computer model would be used to assist in identifying viable routes over the pass (see Appendix D: Alternative Alignment Development Quantm Report). Quantm provides an iterative process to identify alignments that meet defined criteria and HST engineering standards using actual digital geographic data. The model is also provided with "areas to avoid" including environmentally sensitive areas, parklands, established development and other geographic features. In effect, the model optimizes and balances earthwork (cuts and fills) based on the constraints to yield a cost effective alignment.

3.3.4.1 Alignment Alternatives

Quantm returned 50 least costly possibilities of each alignment variation; of these, a single alignment alternative was identified that met the criteria of constructability, geometric alignment, and cost effectiveness. Quantum calculates the lowest cost alignments based on project specific unit costs for the various elements of the HST system while applying a series of logic algorithms to avoid or minimize impacts to sensitive resources. The alignment that best met the criteria was called the Refined Program Alignment because it had similarities to the original program alignment, although it was based on updated geometric criteria (see Figure 3.3-18). Of the alignments computed by Quantm, many were discarded due primarily to bridge heights in excess of 500 feet, some even as high as 900 feet. The engineering design team deemed bridge heights in excess of 300 feet as having a fatal flaw. Other alignments generated were eliminated from consideration because they encroached onto environmentally sensitive areas such as the San Luis Reservoir and State Recreation Area, San Joaquin National Cemetery, Pacheco State Park and Mt. Hamilton (The Nature Conservancy). See Figure 3.3-19.

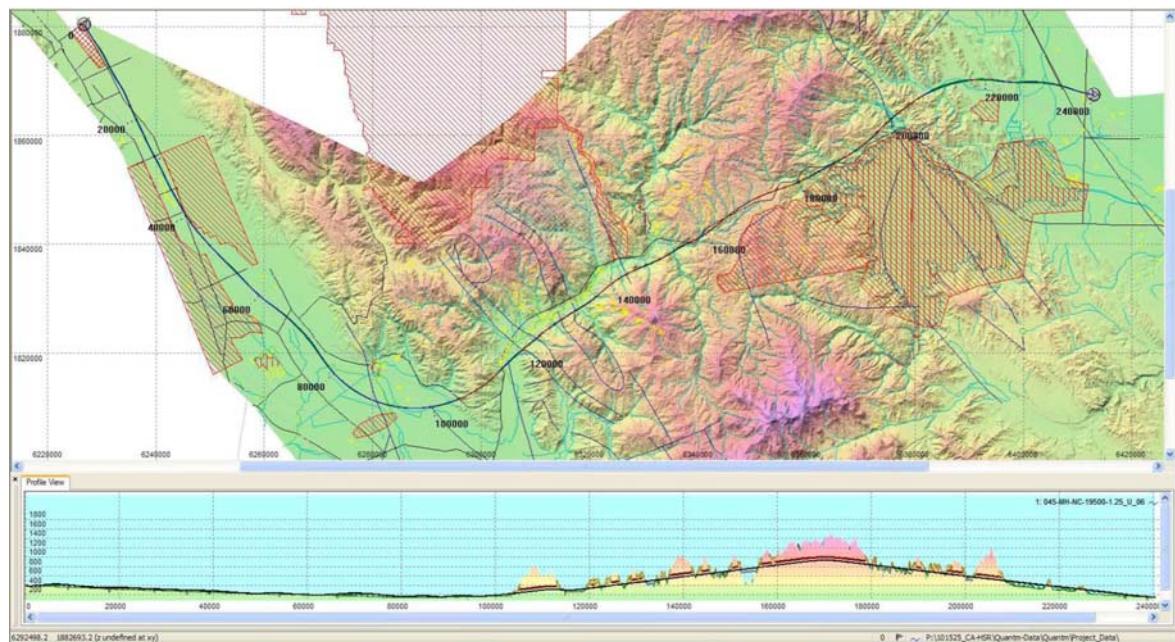


Figure 3.3-19: Quantm Analysis Map Example

(Hatched areas denote sensitive resources)

Utilizing the information provided by the Quantm study, a second alignment was subsequently proposed that diverged from the Refined Program Alignment at the crest of Pacheco Pass and followed close to SR 152 at San Luis Reservoir. It rejoined the Refined Program Alignment just east of the San Joaquin National Cemetery and was named the "Close Proximity to SR 152 Alignment". For purposes of this evaluation, the "Close Proximity to SR 152 Alignment" alternative includes both the divergence area and the common alignment shared with the Refined Program Alignment.

Each alignment alternative generally follows SR 152 east along the valley, making use of viaducts and tunnels to maintain the geometric standards required of a high-speed train including very wide radius curves. They all pass beneath SR 152 near the summit of Pacheco Pass and descend to the floor of the Central Valley on alignments north of SR 152, exiting the hills near Romero Creek. They then pass to the north of the San Joaquin Valley National Cemetery (SJVNC) and cross I-5 near Santa Nella Village. Figures 3.3-20, 3.3-21, and 3.3-22 show portions of the Pacheco Pass area.



Figure 3.3-20: SR 152 in Pacheco Creek Valley Looking East



Figure 3.3-21: Romero Creek Valley Looking West from SJVNC



Figure 3.3-22: SR 152 Looking West near Cottonwood Bay

Refined Program Alignment (Program Alignment)

The Refined Program Alignment Alternative reflects an optimization of the original program alignment with the Quantm software. The refinements include minimizing impacts to sensitive habitats and wilderness areas by altering the elevation and crossing location of the Pacheco Creek Valley near Casa de Fruta. This would place the HST alignment into the hillside to avoid very sensitive Sycamore groves along the creek and pulling the alignment south in the Cottonwood Creek area near San Luis Reservoir.

Close to 152

This alignment alternative builds on the wilderness avoidance improvements of the Refined Program Alignment by staying as close to SR 152 in the vicinity of San Luis Reservoir as the HST design criteria allows. Doing so would reduce the length of access roads from SR 152 to the HST tunnel portals. This shift in the alignment would affect the alignment near Santa Nella, moving the HST north and east of the Program Alignment, meeting Henry Miller Road near the town of Volta. This would keep the HST outside the Santa Nella Village development area. This alignment alternative minimizes impacts to the Upper Cottonwood Creek Wildlife Area by placing the HST as close to SR 152 as possible.

No viable alternatives were withdrawn from consideration in this subsection.

3.3.5 SAN JOAQUIN VALLEY CROSSING SUBSECTION

The San Joaquin Valley Crossing subsection is located between I-5, near Santa Nella Village in western Merced County, and the Merced to Fresno HST corridor in Merced or Madera County. In addition to the Program Alignment, there were six alignment alternatives suggested during scoping. Two of them placed the alignment outside of the majority of the Grasslands Ecological Area's target boundary. Another two attempted to use as much of the median of SR 152 to limit impacts to farm access along the HST alignment. The last responded to concerns voiced by the cities of Chowchilla and Madera and Madera County concerning future growth in the area of the wyes with the Merced to Fresno section (see Figure 3.3-23).

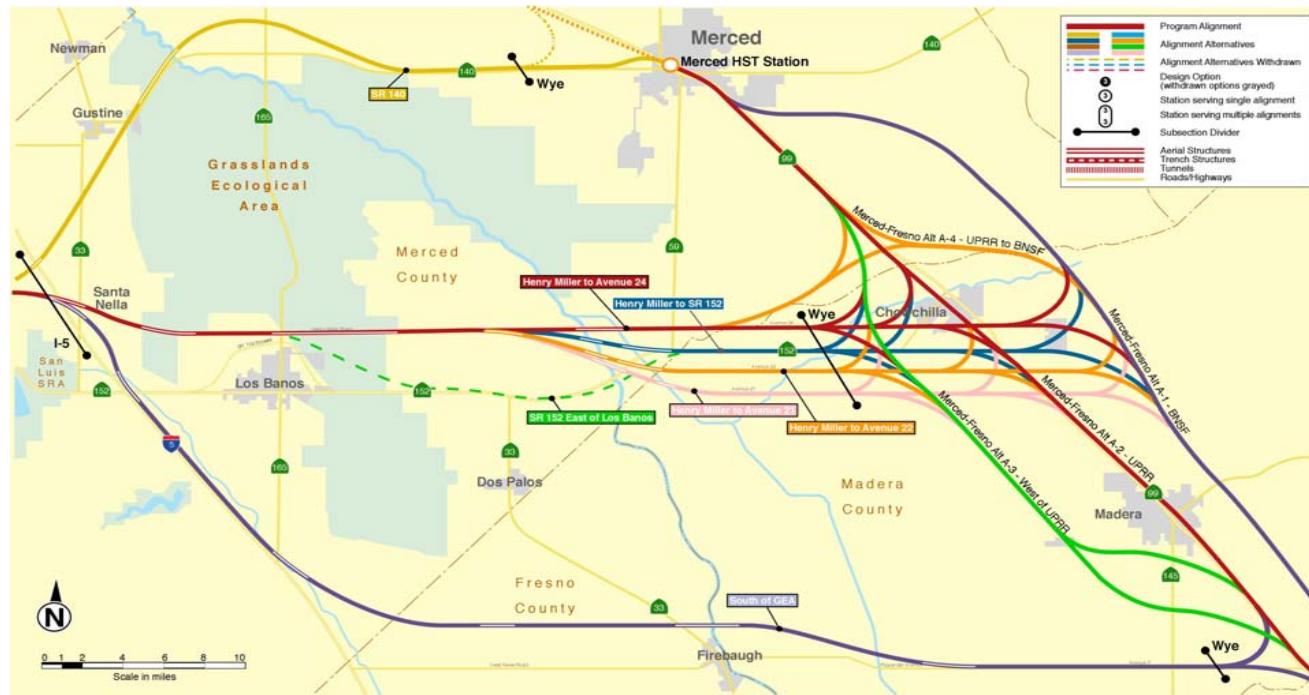


Figure 3.3-23: San Joaquin Valley Crossing Subsection

3.3.5.1 Scoping Session Alignment Alternatives

This subsection contains the Program Alignment and the six alignments suggested in scoping:

- ◆ Henry Miller to Avenue 24 (Revised Program Alignment)
- ◆ Henry Miller to Avenue 22
- ◆ Henry Miller to Avenue 21
- ◆ SR 152 East of Los Banos
- ◆ Henry Miller to SR 152
- ◆ SR 140
- ◆ South of GEA

Henry Miller to Avenue 24 (Program Alignment)

The crossing of the Central Valley, from Santa Nella Village to Chowchilla would be a straight alignment alongside Henry Miller Avenue (see Figure 3.3-24) and Jefferson Road/Avenue 24. Beginning at I-5, near the Whitworth Road overcrossing, the alignment alternative would arc around the north side of Santa Nella Village, turning south towards Henry Miller Road and the town of Volta. Approaching Volta, the alignment alternative would ascend to pass over a branch line of the UPRR and come to grade south of Henry Miller Road.



Figure 3.3-24: Henry Miller Road

After descending, the alignment alternative would continue on the south side of Henry Miller Road. Grade separations would be provided to carry some roads over the HST railway, providing access to properties on each side of the alignment. After passing SR 165, the alignment would ascend to a trestle for approximately three miles immediately adjacent to the south side of Henry Miller Road as it passes along the edge of properties included within the Grasslands Ecological Area (GEA) and the edge of the Los Banos State Wildlife Area. The alignment alternative would descend back to grade to continue along the south side of Henry Miller Road.

The alignment alternative would continue due east, crossing various sloughs and drains parallel to the San Joaquin River. After crossing the main channel of the San Joaquin River, the alignment alternative would run just to the south of Jefferson Road (see Figure 3.3-25). Similar to Henry Miller Road, grade separations would be provided to carry some roads over the railway. Jefferson Road becomes Avenue 24 upon crossing into Madera County. The alignment alternative would continue along the South side of Avenue 24 to its junction with the Merced to Fresno corridor, west of the City of Chowchilla. Design options exist for the location of the wye (junction) between the San Jose to Merced section and the chosen alignment alternative of the Merced to Fresno section of the HST.



Figure 3.3-25: Jefferson Road

Henry Miller to Avenue 22

The Henry Miller to Avenue 22 alignment alternative was suggested by the City of Chowchilla, the City of Madera, and the Madera County Resource Management Agency. It would leave the Program Alignment at the end of Henry Miller Avenue and turn south to cross agricultural lands. It would pass over the San Joaquin River and SR 152 and the Eastside Bypass channel. It would descend back to grade and curve to align with Avenue 22, being on its north side, through agricultural areas, with grade separations provided to carry some roads over the railway, providing access to each side. The alignment alternative would end at the Wye (junction) with the Merced to Fresno corridor (see Figure 3.3-23).

Henry Miller to Avenue 21

The Henry Miller to Avenue 21 alignment alternative was developed after the Merced to Fresno section team suggested that an alignment running east-west near Avenue 21 would allow a wye with the Merced to Fresno HST alignment alternatives that would produce fewer impacts on existing development and resources than an Avenue 22 alignment alternative. It would leave the Program Alignment at the end of Henry Miller Avenue and turn south to cross agricultural lands. It would pass over the San Joaquin River and SR 152 and the Eastside Bypass channel. It would descend back to grade and curve to align with Avenue 21, being on its north side, through agricultural areas, with grade separations provided to carry some roads over the railway, providing access to each side. The alignment alternative would end at the Wye (junction) with the Merced to Fresno corridor (see Figure 3.3-23).

SR 152 East of Los Banos

Comments were received during scoping about the potential access problems for agriculture with the Program Alignment along Henry Miller Avenue. In response, two alignment alternatives were developed to allow the HST to run in the SR 152 corridor. The alignment alternatives vary by where they transition from the Program Alignment to the SR 152 corridor.

The SR 152 East of Los Banos alignment alternative would turn from the Program Alignment near the intersection of Hereford Road and Henry Miller Avenue. It would run at-grade, curving to the south, cutting across resource areas to enter the median of SR 152 west of the Dos Palos Y. The median of SR 152 as it crosses Merced County is generally over 100-feet wide. This would accommodate both Caltrans' ultimate configuration of the highway as a six-lane freeway and the operation of HST in the median. As SR 152 is already a limited access facility, the introduction of HST would not affect access to property along the corridor. The incorporation of the HST into the median would allow SR 152 to be upgraded to a full-freeway, as major cross-streets would be grade separated across both the highway and railway. In the area of Dos Palos Y, the highway would require slight realignment to conform to the geometry of the HST, including the reconstruction of the SR 33 interchange as an overcrossing. Near Island Road, the alignment would ascend to an aerial structure to pass out of the median of the freeway and over the San Joaquin and Fresno rivers. It would descend back to grade to cut across an agricultural area and cross the Eastside Bypass on a viaduct. At Road 4, it would reenter the median of SR 152. Here, either the east or westbound lanes would need to be moved to create a median wide enough to accommodate the high-speed rail facilities (see Figure 3.3-26). Again, new overcrossings of both the railway and highway would allow conversion of SR 152 to a full freeway. The alignment alternative would continue in the median until the junction with the Merced to Fresno corridor.



Figure 3.3-26: View of Median of SR 152 East of Los Banos

Henry Miller to SR 152

The Henry Miller to SR 152 alignment alternative would leave the Program Alignment at the east end of Henry Miller Avenue. It would curve to the south, crossing various sloughs and drains parallel to the San Joaquin River. After crossing the main channel of the San Joaquin River, the alignment would turn to run due east, to align with SR 152. It would enter the median of SR 152 just east of the interchange with SR 59. To accommodate the HST, either the east or westbound lanes would need to be moved to create a median wide enough to accommodate the HST facilities. Again, new overcrossings of both the railway and highway would allow conversion of SR 152 to a full freeway. The alignment would continue in the median until the junction with the Merced to Fresno corridor.

SR 140

Two alignment alternatives have been developed to avoid most, if not all, of the boundary of the Grasslands Ecological Area (GEA): SR 140 and South of GEA (see Figure 3.3-27).

The SR 140 alignment alternative would begin in the Romero Creek Valley, as the HST descends from the Pacheco Pass. It would curve to the northeast and pass through a tunnel to emerge before crossing the California Aqueduct, then I-5, and lastly the Delta-Mendota Canal on an aerial structure. It would pass to the east of Gustine and meet SR 140, where it would run immediately west of the roadway. It would pass through a section of the Grasslands Ecological Area alongside the existing highway, between the North Grasslands Wildlife Area and the Great Valley Grasslands State Park. It would turn to the east at Fremont Ford State Recreation Area, as it crosses the San Joaquin River (see Figure 3.3-26), leaving SR 140. It would then arc north to cross SR 165 near 1st Avenue. It would return to SR 140 near Sultana Drive. It would cross the highway to follow immediately to the south of the roadway. At Central Avenue, there is a junction with a line that turns north towards Atwater to meet the Merced to Sacramento corridor. At North Quinley Avenue, the alignment alternative would cross SR 140 to curve to the north and then south to meet the Merced to Fresno corridor at V Street in Merced.



Figure 3.3-27: SR 140 at San Joaquin River Crossing

South of GEA

The South of GEA (SGEA) alignment alternative would leave the Program Alignment west of Santa Nella Village where it would arc south to curve along the east side of I-5 near Henry Miller Road. It would remain parallel to the freeway until SR 165, where it would begin to curve to the east. It would run south of West Courtney Avenue through agricultural areas (see Figure 3.3-28), with grade separations provided to carry some roads over the railway, providing access to each side. For a distance, it would parallel the Delta-Mendota Canal before ascending to cross over a UPRR branch line and SR 33. It would pass to the north of Firebaugh and cross the San Joaquin River, following the north side of Avenue 9. East of the river, it would curve to the south to run along the north side of Avenue 7. Near Road 25, a junction provides a connection for Merced-bound trains that would arc to the north to meet the Merced to Fresno line just south of Madera. The primary alignment would continue to follow the roadway all the way to SR 99, where the line would arc south to meet the Merced to Fresno corridor at Herndon.



Figure 3.3-28: Land Use Near South of GEA Alignment Alternative

3.3.5.2 San Joaquin Valley Crossing Subsection Alignment Alternatives Withdrawn from Further Consideration

The following alignment alternatives were withdrawn from further analysis in the Alternatives Analysis phase.

SR 152 East of Los Banos

This alignment required crossing 4.5 miles of properties within the boundary of the Grasslands Ecological Area away from any established transportation corridor (see Figure 3.3-29). It added two miles to the base case alignment. It also would have required reconstruction of SR 152 for 13 to 18 miles, requiring close coordination with Caltrans. While initially the highway corridor appeared to present opportunities for the HST, the inability to find an alignment to take advantage of the majority of the SR 152 corridor across the valley, and specifically across the Grasslands area, reduced the benefit of adapting the highway corridor to include HST.

Depending on the outcome of the Merced - Fresno Alternatives Analysis process, other San Joaquin Valley Crossing alignment alternatives may become infeasible due to constraints surrounding various wye (junction) locations. For a discussion of this, see Section 3.3.6.2.



Figure 3.3-29: Typical Wetland near Los Banos

3.3.6 Wye to Merced Subsection

This evaluation of the Wye to Merced subsection was performed by the Merced to Fresno team and their findings reported in the Preliminary Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS, April 2010. The development and evaluation of the junction, the "Wye," between the San Joaquin Valley alignments and the Merced to Fresno alignments was also led by the Merced to Fresno team. The San Jose to Merced team considered the analysis of the Wye in their evaluation of the San Joaquin Valley subsection.

This subsection contains two distinct features, the north-south HST alignment alternatives from Merced to Fresno, and the wye (or junction) where the east-west HST alignment alternatives coming across the San Joaquin Valley from San Jose and Gilroy meet the Merced to Fresno alignment alternatives (see Figure 3.3-30).

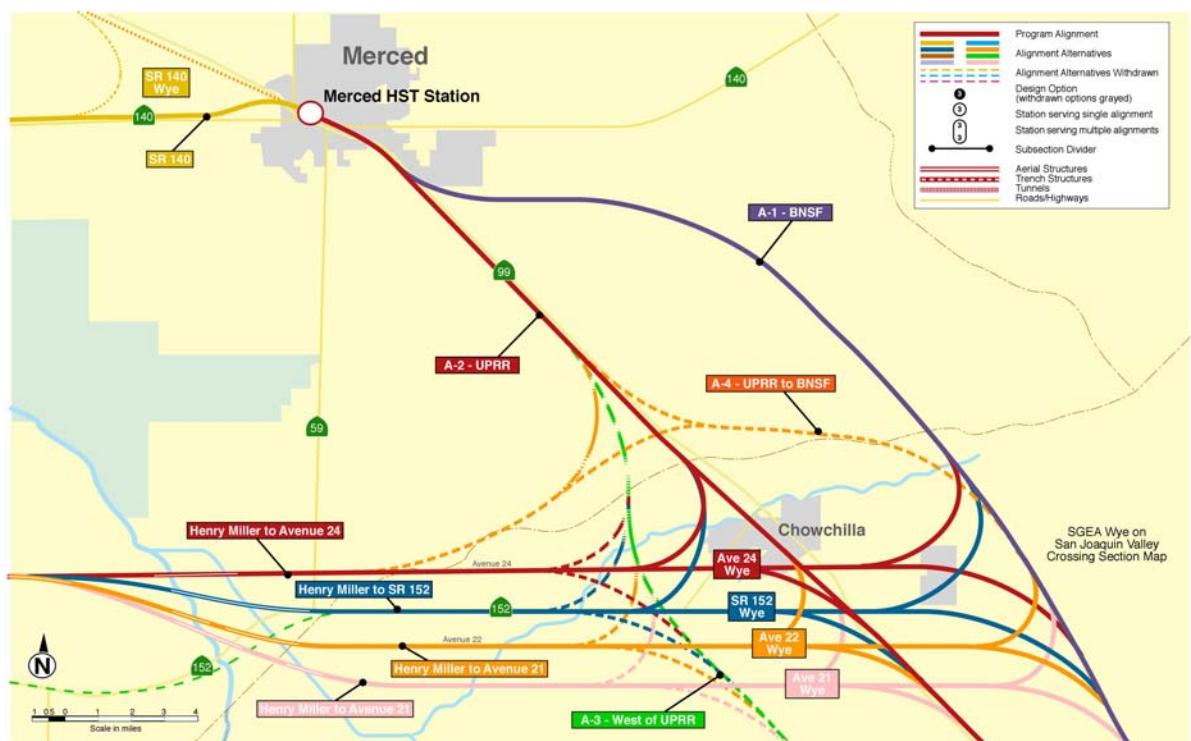


Figure 3.3-30: Wye to Merced Subsection

3.3.6.1 Merced to Fresno Alternatives Considered

The north-south alignment alternatives considered by the Merced to Fresno team were:

- A1 - BNSF
- A2 – UPRR/SR99
- A3 – Western Madera
- A4 – BNSF/UPRR Hybrid

The initial range of project alternatives began with those carried forward by the Statewide Program EIR/EIS and the Bay Area to Central Valley Program EIR/EIS. Because the Merced to Fresno Section serves as a connection point for three other sections, the alternatives are influenced by input from adjoining section studies. Both the UPRR and the BNSF corridors were displayed during the project scoping process for the Merced to Fresno and the Fresno to Bakersfield sections. The initial range of alternatives for the San Jose to Merced Section carried forward the alignment on Henry Miller Road/Avenue 24, which resulted in a railroad Wye junction, with the north leg joining the Merced to Fresno Section north of Chowchilla and the south leg joining south of Chowchilla.

Input on the initial development of project alternatives was collected during the public scoping periods for the Merced to Fresno Section and the San Jose to Merced Section. The initial north-south alignments expanded from two to four, and then later a fifth alternative was suggested after the scoping period ended. These five initial alternatives are summarized below.

BNSF – Adjacent to BNSF Route (Alternative A1 – BNSF)

The BNSF Alternative is consistent with the Statewide Program Preferred Alternative. This alternative generally remains west of the BNSF from Castle Commerce Center through Merced and Madera, then joins to the east side of the UPRR near the San Joaquin River. On the north end, the City of Merced preferred the station to be located downtown near the UPRR and asked that the BNSF Alternative link to the UPRR corridor. Therefore, the baseline Design Option 1 remains adjacent to the BNSF, and two other design options link to the station in Downtown Merced. Design Option 2 follows Mission Avenue from the UPRR to the BNSF. Due to residential impacts and constraints at the SR99/Mission Avenue interchange related to Design Option 2, Design Option 3 is located farther south to follow Mariposa Avenue to the BNSF (see Merced to Fresno Section AA for details of Design Options).

UPRR/SR 99 – Adjacent to UPRR and SR 99 Route (Alternative A2 – UPRR/SR 99)

The UPRR/SR 99 Alternative is consistent with the Bay Area Program Preferred Alternative. This alternative generally remains parallel to but outside of the UPRR right-of-way, opposite SR 99, between Castle Commerce Center and the Downtown Fresno Station. There are no design options considered on this route.

Western Madera Alternative (Alternative A3 – Western Madera)

This alternative follows the UPRR/SR 99 route from Castle Commerce Center southward but deviates to the west before reaching Chowchilla. It moves west to a location approximately 3.75 miles west of and parallel to the UPRR, then returns to be adjacent to SR 99 and UPRR south of Madera. This alternative has two design options south of Madera.

UPRR/BNSF Hybrid (Alternative A4 – UPRR/BNSF Hybrid)

After the scoping period, the City of Chowchilla suggested an alternative that also follows the UPRR/SR 99 route and, like the Western Madera Alternative, deviates from the UPRR before Chowchilla, but which moves east to connect with the BNSF route. The alternative follows the BNSF and then connects back to the UPRR south of Madera. There are no design options suggested on this route.

3.3.6.2 Range of Wye Connection Alternatives Considered

The HST San Jose to Merced Section would connect to the Merced to Fresno Section to the east via a railroad wye connection. A wye is where train tracks branch off a main line to continue in different directions, forming a "Y"-like formation. In this case, the two tracks traveling east-west must become four tracks: a set of two tracks branching northbound and a set of two tracks branching southbound. The location of the wye connection may have a strong influence on the selection of the route traveling east-west between San Jose and Merced and north-south between Merced and Fresno; therefore, the description of the wye connection alternatives are described in the alternatives analysis for the San Jose to Merced HST Project. The Wye to Merced Subsection is shown in Figure 3.3-30.

The initial range of alignment alternatives for the San Jose to Merced and Merced to Fresno sections were concurrently developed and reviewed. After completing the initial reviews, the two project teams studied additional connections between the range of alignment alternatives. This resulted in a myriad of wye alternatives, as there were five east-west alignment alternatives for the San Jose to Merced section and four north-south for the Merced to

Fresno section. Five potential wye connection locations were developed. All were analyzed by the Merced to Fresno Section, based on a connection to the A-1 BNSF and A-2 UPRR north-south alignments:

- SR 140 Wye
- Avenue 24 Wye
- SR 152 Wye
- South SR 152 Wye (supports both Avenue 22 and Avenue 21 alignment alternatives)
- SGEA Wye

As described in the Merced to Fresno Section Alternatives Analysis Report, the Wye connections were carried into the detailed alternatives analysis evaluation. These wye connections were paired with the best-performing Merced to Fresno alignment alternatives: Ave 24 to A-3 and A-4; SR 152 to A-3; and South SR 152 to A-1, A-2 and A-3.

3.3.6.3 Merced to Fresno Station Location Options

As described in the Merced to Fresno Section Alternatives Analysis Report, three station location options were carried forward into the detailed alternatives analysis as described below.

Castle Commerce Center Station would occupy a large portion of land along the northeast side of Santa Fe Drive and the UPRR corridor in Atwater, north of Merced. A station located here would be in the vicinity of or on the grounds of the Castle Airport.

Merced Amtrak Depot would be located at the existing Amtrak Depot in Merced, which is currently bounded on the north and south by West 24th Street and West 25th Street and to the east and west by K Street and G Street. The future HST station would occupy a much larger area, possibly extending to M Street to the west and 5th Avenue to the east.

Downtown Merced Intermodal Transit Center would be located at the existing Merced Intermodal Transit Center, which is currently bounded on the north and south by West 16th Street and West 15th Street and to the east and west by M Street and O Street. The future station would occupy a much larger area, possibly extending to SR 59 to the west and Canal Street to the east.

3.4 Agency Coordination and Public Outreach

3.4.1 OUTREACH TO AGENCIES AND THE PUBLIC

Early and continuing coordination with the general public and appropriate public agencies has been an essential part of the overall environmental review process and the AA process specifically. Agency consultation and public participation activities have been accomplished through a variety of formal and informal methods including: interagency Technical Working Group (TWG) meetings; Public Information Meetings (PIMs); informal meetings with key community leaders, select members of the public and local/resource agency staff; informal resource specific agency meetings; informational open houses and informal presentations to community organizations and groups; letter, email and phone requests for information and coordination; and distribution of public notices, fact sheets, and a Frequently Asked Questions document with project information and updates on the ongoing studies.

3.4.1.1 Early Outreach and Scoping (December 2008 - May 2009)

A comprehensive public involvement program was developed to seek input and advise the public and agencies of project developments during the environmental review process. Pre-scoping public outreach activities were initiated in December 2008, including the development of project information materials, establishment of a project information phone line, early engagement with interested parties, and media communications. On February 23, 2009, a Notice of Preparation (NOP) announcing the preparation of the EIR was distributed to the State Clearinghouse; elected officials (federal, regional, local), and federal, state and local agencies, including the planning and community development directors in each county, and the interested public. A Notice of Intent (NOI) announcing the preparation of the EIS was published in the Federal Register on March 16, 2009.

The agency and public outreach effort was kicked off with a scoping process initiated in March 2009. Public and agency scoping meetings were held in Merced (March 18, 2009), San Jose (March 25, 2009) and Gilroy (March 26,

2009). More than 300 residents, property and business owners, agency representatives, elected officials, the media and others participated in these meetings. The meetings provided information about the history of the HST project to date, the Program EIR/EIS alternative, the upcoming steps in the environmental review process, including alternatives development and analysis. Input received during the scoping process resulted in the inclusion of a number of additional alternatives that are the subject of this Preliminary Alternatives Analysis Report. A comprehensive summary of the scoping process and input obtained can be found on the High Speed Rail Authority's website under the San Jose to Merced Section located under the Library tab on the home page.

3.4.1.2 Alternatives Analysis Agency and Public Participation Activities (September 2009 - June 2010)

The San Jose to Merced Section team conducted a number of agency, general public and small group meetings throughout the ongoing alternatives analysis effort. The purpose of these meetings is to explain the alternatives analysis process, share the results of its preliminary studies with the public and agencies and receive feedback. As noted, public and agency input played a key role in defining and refining many of the alignment alternatives presented in this preliminary report. In addition to the more formal public and agency meetings noted below the project team has conducted dozens of small group meetings with specific agencies such as the Greater Gardner, Willow Glen and Silverleaf neighborhood associations, Sierra Club, Grasslands Water District, Santa Clara Valley Transportation Authority, City of San Jose Department of Transportation (other departments), City of Chowchilla, Transportation Agency of Monterey County, City of Los Banos, City of Morgan Hill, City of Gilroy, Nature Conservancy, Caltrans District 4, Union Pacific Railroad, Santa Clara County Roads and Airports Department, Greenbelt Alliance, SF Chamber of Commerce, Diridon Station Area Working Group, City of Gilroy Chamber of Commerce, California Department Of Water Resources, National Marine Fisheries Service, Voices of San Jose, Santa Clara County Board of Supervisors (District 1), San Jose Mercury, City of Merced, US Environmental Protection Agency and US Army Corps of Engineers.

The following is a summary of key public and agency meetings held during the alternatives analysis process and the key issues/questions raised by participants. A comprehensive summary of the public meetings and the input received at them can be found in Appendix G of this report.

September 2009 Scoping/Alternatives Analysis Technical Working Group Meetings

Two Technical Working Group meetings were held in Gilroy (September 3) and Merced (September 10). The presentation by the project team included information about the project schedule and study process, the alternatives analysis effort, a summary of scoping comments, a review of current alignment alternatives and a review of alternatives analysis and key design objectives and criteria. The following outlines the key questions and comments received:

- Clarification about who the Authority is coordinating with locally
- Type/kind of comments that are being solicited at this stage of the study
- Specific questions about alignments in San Joaquin valley area
- Questions about right-of-way coordination efforts
- Coordination plan relative the Diridon station and the SF to SJ Section project team
- Operating information including how many trains per day anticipated? Which cities they will stop at, etc.
- Cost differential between vertical profile options
- Concern about noise, vibration and related impacts
- Questions about impacts to biological resources and plans to assess this
- Anticipated funding contribution from the federal government
- How public and agency input will be incorporated

October 2009 Alternatives Analysis Public Information Meetings

Three meetings were held along the San Jose to Merced corridor to provide information about the initial set of alternative alignments developed from scoping comments. The meetings were held in San Jose (October 6), Merced (October 8) and Gilroy (October 12). In total, these meetings drew approximately 300 participants. The format of these meetings included an open house and presentation followed by a question and answer session.

Key issues raised during these meetings (via verbal and written comments) included:

- Vertical (tunnel, trench, at-grade, aerial) and horizontal profiles of alignments
- Impacts to neighborhoods and local roads
- Concerns about eminent domain and potentially diminished property values
- Impacts to agriculture

The initial alternatives shown at these meetings were further refined and reviewed in November 2009 by Federal Railroad Administration (FRA) and Authority staff. They were subsequently presented to the Authority Board as an information item at their December 3, 2009 Board meeting.

December 2009 Technical Working Group Meetings

A second round of Technical Working Group meetings were held in December 2009 to share the preliminary studies from the alternatives analysis process and the recommendations from the FRA/Authority workshop and Authority Board meeting. On December 14, local, transportation and resource agencies met with both the San Jose to Merced Section and Merced to Fresno Section teams in Merced. On December 16, local, transportation and resource agencies met with the San Jose to Merced Section team in Gilroy. During each of these meetings, project staff presented on the alternatives analysis process, the current alignment alternatives under consideration and responded to comments and questions.

Key issues raised during the TWG meetings included:

- Anticipated right-of-way (ROW) requirements for the system
- Vertical profiles of alignments (tunnel, at-grade, aerial)
- Impacts to biological and water resources
- Decision-making timeline
- Negotiations with UPRR on the use of/access to their right-of-way
- Effects on residents, especially noise and vibration

December 2009/January 2010 Public Information Meetings (Open Houses)

Public information meetings were held in December 2009 and January 2010, following the Technical Working Group meetings, to share ongoing alternatives analysis results and feedback for the FRA workshop and Authority Board meeting. The meetings were held in Merced (December 17, jointly with the Merced-Fresno Section), Gilroy (January 11) and San Jose (January 12). In total, the meetings drew approximately 300 participants. The meetings were held in an open house format, during which attendees viewed exhibit boards detailing the latest information and had the opportunity to ask staff questions about the project. Comments were provided via written comment cards.

Key issues raised during these meetings included:

- Requests for evaluation of a tunnel option in downtown San Jose
- Concerns about impacts from alignments east of Highway 101 in Gilroy and station location near Leavesley Road
- Concern that residents living east of Highway 101 in Gilroy were not properly notified about the project and meetings
- Protection of farmland

March 2, 2010 San Jose Alternatives Analysis Community Workshop

In March, the project team hosted a community workshop and panel discussion that focused on the alignment alternatives in the south of Diridon Station to Tamien Station area. Based on public and agency requests for the study of a tunnel alignment in this area, the project team presented more detailed information on the alignments being evaluated in the San Jose area and specifically on a deep tunnel and station option. The workshop drew approximately 150 participants and featured an open house and presentation, followed by a panel discussion conducted by local leaders from the following organizations: the California High Speed Rail Authority, the Greater Gardner neighborhood, City of San Jose Districts 3 and 6, the City of San Jose Department of Transportation, the Peninsula Rail Program/Caltrain, Caltrans, and the Santa Clara Valley Transportation Authority.

Key issues raised during the workshop (via verbal and written comments) included:

- Questions regarding train operations, including hours of operation, frequency and speed
- Impacts to communities from construction and operations, especially noise, vibration and local road closures
- Impacts to property, including potential damage to homes, eminent domain and potentially reduced property values
- Community cohesion and related adverse impacts that the proposed project might create

Following the meeting, the project team compiled the attendees' questions and concerns into a Frequently Asked Questions document, now available on the Authority website (http://www.cahighspeedrail.ca.gov/images/chsr/20100510094151_San%20Jose%20to%20Merced%20FAQs_May2010.pdf).

May 3, 2010 Gilroy City Council Study Session

At the request of the Gilroy City Council and residents east of Highway 101 (in the Gilroy area and unincorporated Santa Clara County), the project team presented to the Council and approximately 100 members of the public at a council study session on May 3, 2010. The presentation focused on the Revised Program-Level EIR, the alternatives analysis process and results to date, and next steps in community engagement for Gilroy and the surrounding communities. Prior to the presentation, the project team displayed informational exhibits, large preliminary alternatives analysis maps and detailed map booklets that showed each proposed alignment in the Morgan Hill-Gilroy area.

Key issues raised by the council members and public during the study session included:

- The status of negotiations with Union Pacific Railroad (UPRR) and effects of potentially not being able to share its ROW
- Impacts to communities, property values and agriculture from an alignment east of Highway 101
- Impacts associated with each of the station location options
- A more comprehensive engagement effort for the Gilroy, Morgan Hill and the surrounding unincorporated area

May 5-6, 2010 South of Diridon Station to Coyote Creek Alternatives Analysis Open Houses

Two informational open house meetings were held in San Jose on May 5, 2010 and May 6, 2010 to share new information on the alternative alignments in the South of Diridon Station to Coyote Creek area. Based on a request by the City of San Jose, the project team provided information on analysis of a new shallow tunnel and station option in downtown San Jose. In total, the open houses drew approximately 120 attendees. During the meetings, information on the alignments was presented on exhibit boards, and attendees were able to speak with project staff about specific questions and concerns. Detailed section and subsection maps and map booklets were also available.

Key issues raised during the open houses (via verbal and written comments) included:

- General support for consideration of the shallow tunnel alignment
- Ongoing concerns about the refined program alignment's impacts to surrounding neighborhoods
- Willingness to consider, and in some case support for, the I-280/SR 87 alignment option
- Concerns about local road closures and narrowing of Monterey Highway

Following the Gilroy City Council Study Session and San Jose open houses, the project team posted detailed alignment alternative maps to the Authority website (<http://www.cahighspeedrail.ca.gov/library.asp?p=9492>) and also distributed hardcopy map booklets to the main libraries in San Jose, Morgan Hill, Gilroy, Los Banos and Chowchilla.

3.4.2 ALTERNATIVES ANALYSIS PUBLIC PARTICIPATION NEXT STEPS

Following the presentation of the Preliminary Alternatives Analysis Report to the Authority Board, a third round of Technical Advisory Group and Public Information Meetings will be conducted to obtain input and feedback on the alignment alternatives, stations and design options recommended to be carried into the EIR/EIS. Input and feedback

will be evaluated and any recommended changes to the alignment alternatives will be presented to the Board later in summer 2010, and a supplemental AA Report will be published.

3.5 Alternatives/Options Carried Forward and Not Carried Forward into Detailed Evaluation

Based on the initial review of alternatives and subsequent input from the Technical Working Groups, the project team proceeded with the analysis of alternatives and options as follows.

Alternatives and Design Elements That Were Not Carried Forward

San Jose Station Approach Subsection

- ◆ Voices of San Jose Thread the Needle
- ◆ Voices of San Jose 5,100-meter Tunnel

Monterey Highway Subsection

- ◆ SR 87/85

San Joaquin Valley Crossing Subsection

- ◆ SR 152 East of Los Banos

Alternatives and Design Elements That Were Carried Forward

San Jose Station Approach Subsection

- ◆ Refined Program Alignment
- ◆ SR 87 / I-280
- ◆ Shallow Tunnel
- ◆ Deep Tunnel
- ◆ Downtown Aerial
- ◆ South of Caltrain Tracks
- ◆ Three Track

Monterey Highway Subsection

- ◆ Refined Program Alignment
- ◆ East of Caltrain/UPRR

Morgan Hill - Gilroy Subsection

- ◆ East of UPRR to Downtown Gilroy
- ◆ US 101 to Downtown Gilroy
- ◆ Gilroy Station Loop
- ◆ East of UPRR to East Gilroy
- ◆ US 101 to East Gilroy

Pacheco Pass Subsection

- ◆ Refined Program Alignment
- ◆ Close Proximity to SR 152

San Joaquin Valley Crossing Subsection

- ◆ Henry Miller to Avenue 24 (Program Alignment)
- ◆ Henry Miller to Avenue 21
- ◆ Henry Miller to Avenue 22
- ◆ Henry Miller Road to SR 152
- ◆ South of GEA
- ◆ SR 140

Wye - Merced Subsection

- ◆ A-1 BNSF
- ◆ A-2 UPRR
- ◆ A-3 Western Madera
- ◆ A-4 UPRR/BNSF Hybrid

Merced Station Locations

- ◆ Castle Commerce Center
- ◆ Merced Amtrak Depot
- ◆ Downtown Merced Intermodal Transit Center

Wye Connections

- ◆ Avenue 24 Wye Connection
- ◆ SR 152 Wye Connection
- ◆ South SR 152 Wye Connection (supports both Avenue 22 and Avenue 21 alignment alternatives)
- ◆ SGEA Wye Connection
- ◆ SR 140 Wye Connection

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4.0 Evaluation of Subsection Alignment Alternatives, Station Location Options and Design Options

The alignment alternatives, station location and design options carried forward into the detailed alternatives analysis (see Figure 4.0-1 on the following page) were assessed for each of the project objectives and evaluation measures. This information was then used to determine which alternatives should be carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. The alignment alternatives, station location and design options selected for continued evaluation were evaluated using the measures and methods described in Chapter 2 (see Table 2.3-1 and Tables 2.4-1 through 2.4-5). The primary evaluation measures are listed below.

- Design objectives (including measures such as travel time and cost)
- Land use (including measures such as consistency with land use and general plans)
- Constructability (including measures such as track type construction and access to the corridor)
- Community impacts (including measures such as amount of land acquisition)
- Natural resources (including measures such as impacts to wetlands, potential threatened and endangered species habitat, and important farmlands)
- Environmental quality (including measures such as number of sensitive noise receptors)
- Additional considerations (including measures such as ability to meet project purpose and support by public and agencies)

The detailed evaluation of the subsection alignment alternatives is provided in the Evaluation Tables in Appendix B and discussed in Sections 4.1 through 4.6. A summary of the alternatives to be carried forward for further consideration in the EIR/EIS is presented in Section 5.0.

4.1 San Jose Station Approach Subsection

4.1.1 EVALUATION OF ALIGNMENT ALTERNATIVES

Under the San Jose Station Approach subsection, seven alignment alternatives were identified for comparison against the evaluation measures:¹

- Refined Program
- South of Caltrain Tracks
- Three Track
- Deep Tunnel
- Shallow Tunnel
- Downtown Aerial
- SR 87/I-280

Tables 1A and 1B in Appendix B list each of alignment alternative and station location option considered in the San Jose Station Approach Subsection and identify whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguish among the alternatives are highlighted on the tables. The performance of the seven alignment alternatives against the evaluation measures is described below.

Each of the alignment alternatives would be generally consistent with the stated purpose and need of providing rapid and efficient transportation service. All of the alternatives would be consistent with City of San Jose and Santa Clara County general plans to expand public transit and other related infrastructure to improve regional and inter-regional access and to provide for a safe, efficient and technologically advanced multi-modal transportation system. To varying degrees, all alignment alternatives raised concerns for the potential to affect communities and the environment, as discussed below.

Refined Program Alignment Alternative (see Figure 4.1-1) was developed to refine the 2008 Program Alignment (PA) to maximize use of the existing Caltrain right-of-way, satisfying the Authority's major objective of following existing transportation corridors to the greatest extent possible as stated in the purpose and need statement. In most locations south of the Diridon Station, the existing right-of-way, owned by Caltrain, can accommodate two tracks for Caltrain/UPRR and two tracks for the HST. The Gardner neighborhood has raised major concerns regarding the impacts of this alignment on the local community, including among others noise/vibration, community cohesion, traffic, safety, visual, construction impacts, and impacts on Fuller Park and a house of worship (nonprofit). Along with the South of Caltrain Tracks, Three Track and Downtown Aerial alignment alternatives, it would have the lowest capital cost factor. This alignment alternative potentially would result in moderate impacts to biologically sensitive areas and cultural resources. Because the Refined Program Alignment Alternative would have more substantial impacts on the Greater Gardner/North Willow Glen neighborhood than the other alternatives for this subsection and there is considerable local opposition to this alternative, this alignment alternative is withdrawn from further consideration.

South of Caltrain Tracks Alignment Alternative would not be within the Caltrain right-of-way to the same extent as the Refined PA and would result in approximately 10 to 18 additional residential property takes (dwelling units) compared to the Refined PA. The alignment alternative would potentially affect one house of worship (nonprofit). It would result in major visual impact where the HST tracks would traverse Fuller Park and potentially would permanently acquire approximately 1.3 acres of the park. The alignment alternative would result in fewer impacts to biological resources and about the same cultural resources impacts when compared to the Refined PA. The South of Caltrain Tracks alignment alternative is withdrawn from further evaluation because it would not be in the Caltrain right-of-way to the extent of the Refined PA and would require acquisition of a greater number of developed parcels than the Refined PA.

Three Track Alignment Alternative would require the reduction from two Caltrain/UPRR tracks to one, resulting in unacceptable operating constraints for Caltrain, UPRR and other passenger and freight rail systems using the Caltrain corridor. This disruption to existing railroad operations is fully inconsistent with the Caltrain operating plan and constitutes a fatal flaw for this alignment alternative; therefore, this alignment alternative is withdrawn from further consideration.

¹Two alignments were withdrawn early in the AA process for the San Jose Station Approach subsection: (1) Voices of San Jose 5,100 Meter Tunnel, and (2) Voices of San Jose Thread the Needle Tunnel. These tunnel proposals would involve construction of a deep subsurface station and alignment under the active Diridon Station freight and passenger tracks with the associated constructability and cost issues. The Project Team met with representatives of the Greater Gardner/Willow Glen neighborhood who agreed that the tunnel alignment recommended by the City of San Jose would be more practicable and would serve the same goals as the other proposed tunnels; therefore, those two Voices of San Jose tunnel concepts were dropped.

Figure 4.0-1: San Jose to Merced Section—Alignment Alternatives Carried Forward into Detailed Alternatives Analysis

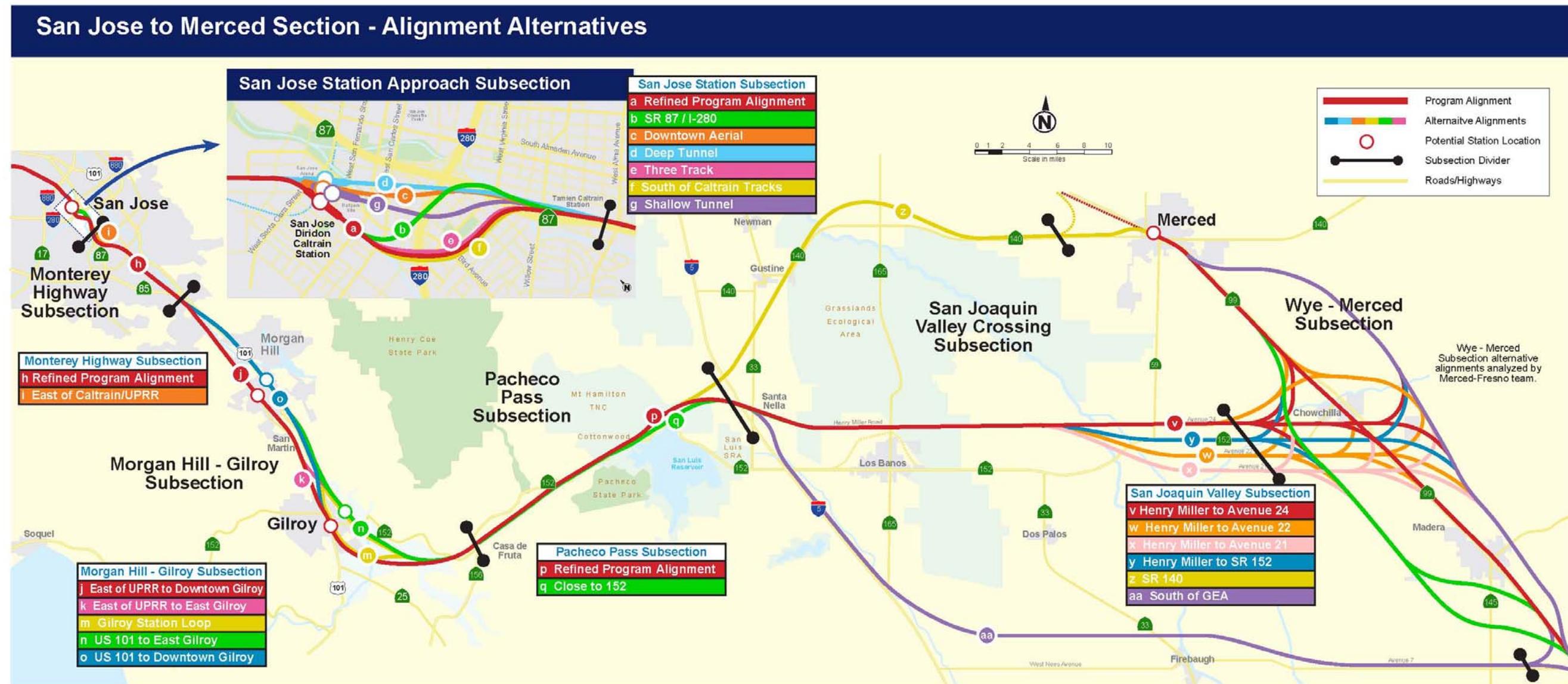
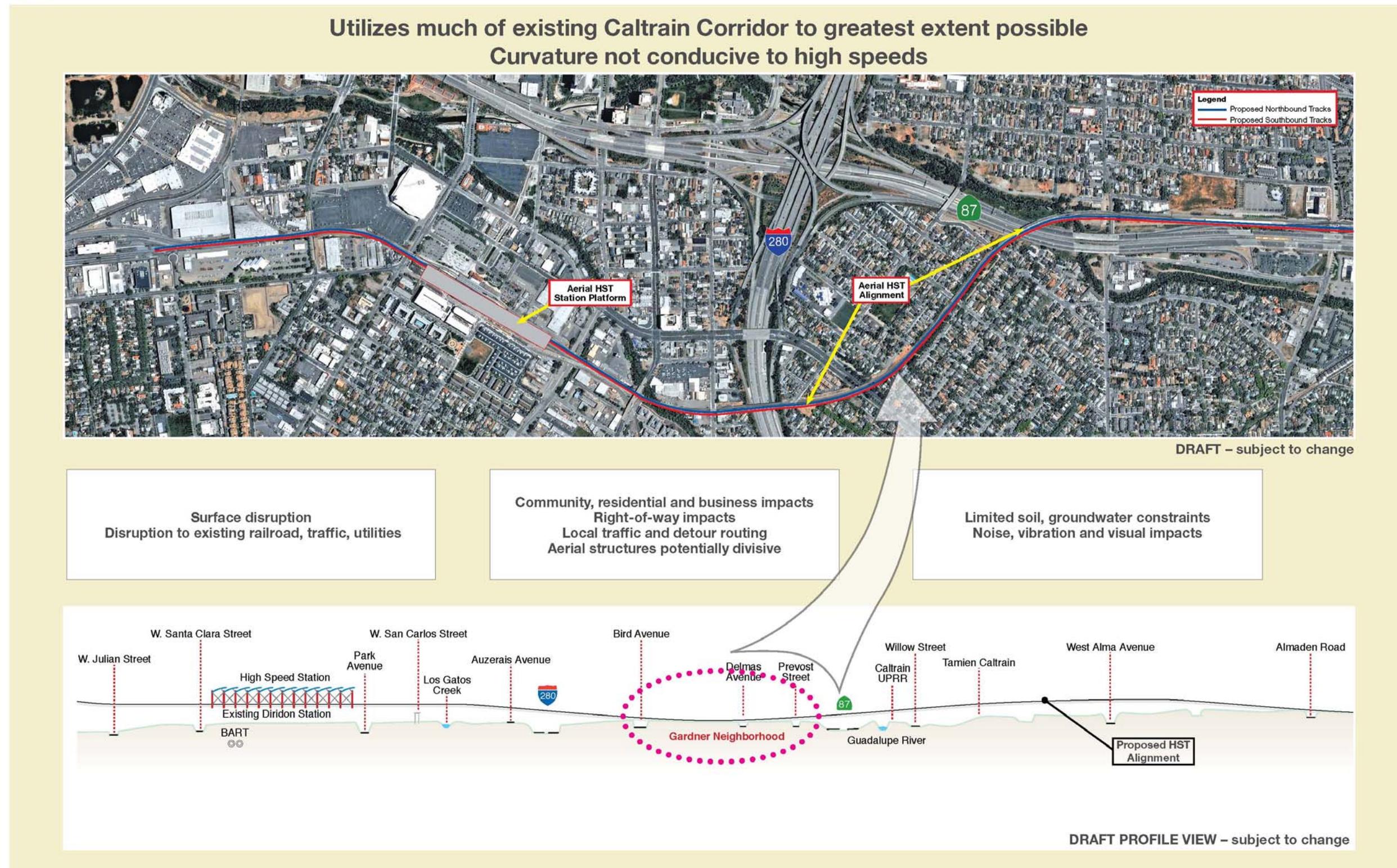


Figure 4.1-1: Refined Program Alignment



Deep Tunnel Alignment Alternative (see Figure 4.1-2) is impracticable due to its very high construction risks and very high construction costs – seven times higher than the costs for the Refined PA. The high risk and costs are a result of the following factors:

- Potential settlement and its associated cost for repairs and damages;
- Unsafe mining conditions to craftsmen and equipment due to extremely poor ground and high water table which could cause water infiltration and cave-ins during construction of the deep station (140-feet deep) and the construction of the track transition caverns (area where the tracks transition from two to four tracks for the station (see Figure 11, Preliminary Geologic Profile in Appendix C);
- Utilization of a mining method that has not been tried in the United States on a station complex of this size (a cavern 70-feet wide by 40-feet high by 1,380-feet long);
- Performing soil improvements from the surface for the excavation of tunnels and caverns;
- Construction schedule delays and possible contractor claims. Construction duration for HST stations would range from seven years to 16 years (see Table 5, in Appendix C);
- Settlement potential of foundations of the SR87/I-280 interchange;
- Surface impacts associated with ventilation, stairs, elevator shafts, and emergency access shafts, which potentially would result in residential or business impacts or displacements due to the need to locate these shafts at the surface. The actual number would need to be determined during more detailed design;
- Reconstruction of the Tamien Station to accommodate the tracks surfacing from the tunnels (see Figure 4.1-3); and
- Relocation and reconstruction of the northbound SR 87 on-ramp located adjacent to the Tamien Station.

This type of station construction is not under consideration for any of the stations in the 800-mile California HST system and has not been used for any HST Station in the world. Subsurface HST stations are constructed using cut-and-cover techniques rather than mining. Existing HST stations were constructed using cut-and-cover techniques (e.g., HST stations in Taiwan, Berlin Central Station) or the pipe roof arch method and "sheeted trench" method (e.g., Antwerp HST station in Belgium) rather than traditional mining methods.

In addition, all tunnel alternatives would have higher operating costs (ventilation, pumps, lighting, stairs and elevators, etc.), costlier fire prevention, and greater time required for emergency response (in case of a fire).

This alignment would also involve trenching from the southern tunnel portal south through the Tamien Station area. This would adversely affect a National Register archaeological site and cause substantial delays in the project. Mitigation would typically require extensive archaeological field work and burial removal.

The Deep Tunnel Alignment Alternative would have the fastest journey time (0.88 minutes) of all seven of the alignment alternatives within the San Jose Station Approach subsection.

The Deep Tunnel Alignment Alternative is impracticable since it would result in critical risks due to ground conditions, have major constructability issues, significant impacts to a National Register archaeological site, lengthy construction schedule, and substantial capital cost. This alignment alternative is **withdrawn from further consideration**.

The City of San Jose requested further study be performed on a Shallow Tunnel Alignment Alternative and this alternative is described below. Table 4.1-1 provides a comparison of the deep and shallow tunnel alternatives.

Table 4.1-1: Comparison between "Deep Tunnel" and "Shallow Tunnel" Alignment Alternatives

	"Deep Tunnel" Alternative	"Shallow Tunnel" Alternative
Construction Methods-Station	Conventional segmental mining (SEM) requiring ground stabilization installed with equipment operating from the surface	Cut and cover for station and track transition sections
Construction Methods-Tunnel	<ul style="list-style-type: none"> • SEM for turnouts, cross-overs and cross passages • EPBM for tunnels 	<ul style="list-style-type: none"> • EPBM or slurry tunnel boring machine south of San Carlos Ave. • Cut and cover north of San Carlos Ave. • SEM for cross passages
Station Configuration	1,380-ft long, 70-ft wide by 40-ft high, 140-ft deep	1,380-ft long, 90-ft wide by 30-ft high, 80-ft deep
Construction Cost	\$3 billion	\$1.3 billion (increases BART cost by more than \$140 million)
Track Work	Multiple track configurations including 2 bore, 4 bore, non-circular locations for track switching, turnouts and cross-overs)	Express tunnels constructed by TBM methods and would run outside the station
Location relative to proposed BART station	Below proposed BART station	Above proposed BART station (BART to be lowered to accommodate HST.)
Risks/Impacts	<ul style="list-style-type: none"> • Ground stabilization injected from the surface along the alignment, as needed prior to and during construction to reduce surface settlement and cave-ins at the station and tunnels • Vertical access shafts for tunnel entrance, vents, fire-life safety personnel and equipment • Construction access areas for concrete plants, contractor's "lay down" areas for equipment and excavated materials • Tunnel construction requires additional areas for assembly of TBM's "trailing gear" • Ground movement and settlement • Vibration • Reconstruct Tamien Station • Adversely affect a National Register archaeological site 	<ul style="list-style-type: none"> • Extensive site preparations including utility relocations and muck removal • Disruption to existing railroad (Caltrain, Amtrak, PACE, UPRR, Freight VTA-Vasona Line), traffic, utilities, communities, residences and business • Extensive right-of-way for construction and staging • Up to 1-2 acres adjacent to and outside the cut & cover footprint for staging and equipment • Support VTA LRT during construction • Maintain Los Gatos Creek flows during construction • Limits on future development • Reconstruct Tamien Station • Adversely affect a National Register archaeological site • Redesign BART alignment and BART Diridon Station to pass under the HST Station • Requires BART to adopt design exceptions to increase vertical grades to pass under the HST Station • Requires BART to build deep, mined station increasing construction risks, schedule and cost

Figure 4.1-2: Conceptual Downtown "Deep Tunnel" Alternative

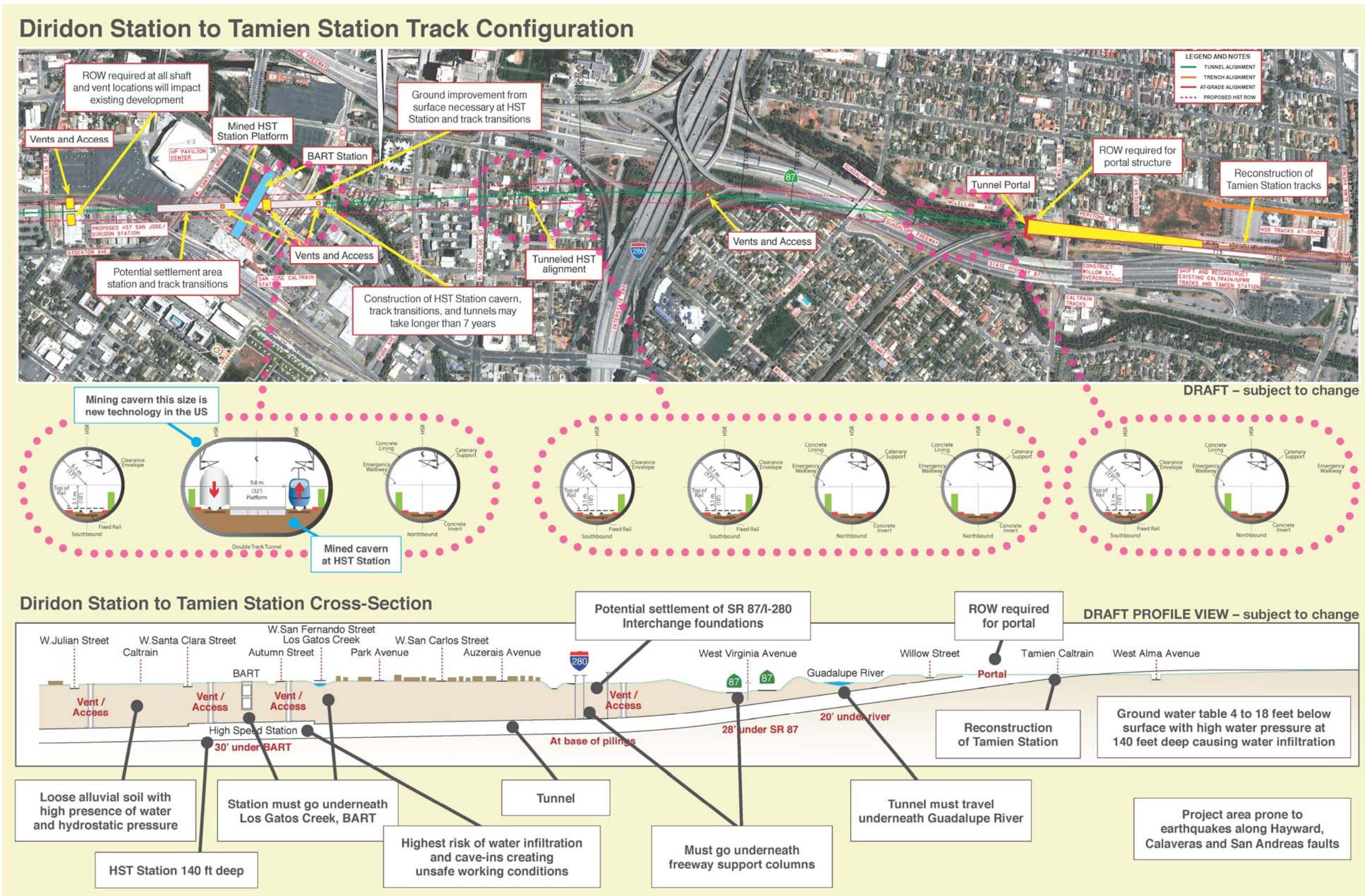


Figure 4.1-3: Tunnel Overview – Ground Conditions

Conditions on and under the Ground

SOIL

- Presence of clay, silt, sand and gravel, which go as deep as 1,000 feet below ground level
- These types of soil require ground support to reduce water infiltration and cave-ins

HYDROLOGY

- Groundwater ranges from 4 to 18 feet below the ground surface, with very high water pressure at 140 feet (the depth of the HST deep station)
- Construction must be water tight to prevent excessive groundwater inflows

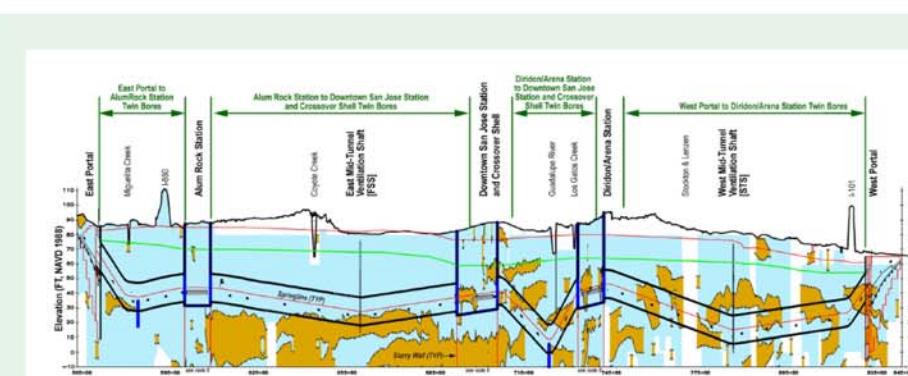
EXISTING BUILDINGS AND STRUCTURE FOUNDATIONS

- Tunnel would be located in an urban area, among a dense concentration of existing buildings and structure foundations (including SR 87/I-280); settlement mitigation will be extensive, with the potential for contractor's claims to be very high
- The primary access point for construction will be at the portals and at cut and cover locations
- Surface impacts will occur when performing ground stabilization (to improve poor soils for station, tunnels, and transition structures) and constructing access points, ventilation vents, and openings for emergency response
- In the case of a shallow tunnel, cut and cover construction techniques will require full access to ground/surface during the entire construction duration along planned non-tunnel track alignment and station location, as well as some areas surrounding construction for staging and equipment

Ground investigations performed for the proposed BART project show the presence of silty clay, sand and gravel. It is assumed that the proposed HST tunnel and station would be excavated in similar ground conditions.

Inherent Risks and Uncertainties

- Ground settlement requires ground pre-treatment for both tunnel alternatives
- Earthquakes and subsequent liquefaction
- Major ground surface impacts, including vibration from construction and operations and fans providing construction ventilation, right-of-way acquisitions for shafts, portals, and station access
- Impacts on Guadalupe River and Los Gatos Creek; Los Gatos Creek must maintain its flow during construction of a shallow cut and cover HST station
- Impacts on proposed BART station and VTA Vasona LRT Extension
- Impacts to surface conditions and buildings; ROW required for transition structures of shallow tunnel located in area of new residential development
- Limited future development above underground HST facilities; protection of HST facilities may cost \$860 million



Silts, clays and organic soils. Included in this layer are man-made fill consisting of asphalt concrete and aggregate base encountered most often within five feet below ground surface; thin layers of coarse-grained soil.

Sands and gravels. Included in this layer are cobbles; thin layers of fine-grained soil.

Preliminary Geologic Profile along the Proposed SVRT Project Site (Source: HMM/Bechtel, 2008d)

Shallow Tunnel Alignment Alternative would meet the community objective of minimizing disruption to the Greater Gardner/North Willow Glen neighborhood (see Figures 4.1-4 and 4.1-5). The alternative does have less construction risks and lower construction costs than the Deep Tunnel Alignment Alternative but there are other factors that make this alternative impracticable. The major factors are as follows:

- Additional right-of-way would be necessary in the area of the newly developed residential property between San Carlos Street and Auzerais Street in order to construct the South track transition structure and additional right-of-way would be necessary in the area of the commercial property North of the Diridon Station to build the North track transition structure (see the areas shaded in red on Figure 4.1.5);
- BART Silicon Valley, with the approval of VTA and BART, would require re-designing its alignment and its Diridon Station to pass under the Shallow HST station (BART Silicon Valley EIS/EIR and 65% Design is under review). This would require BART to adopt design exceptions to increase its grades an additional 1.5 percent from the Market Street Station to the re-designed, deep Diridon Station. VTA and BART would have to construct a deep mined station which would increase construction risks, schedule, and costs. (It is anticipated that BART Silicon Valley would cost approximately \$3.2 billion for the BART tunnels/stations between US 101/Santa Clara Street and the BART Santa Clara Station. It is estimated that the mining of the BART station below the HST station would add approximately \$140 million due to the mined BART station);
- Performing permeation grouting for stabilization purposes in areas of low tunnel cover at the SR 87 undercrossing;
- Increase the disruption to existing uses as well as limiting and adding costs to future developments desiring to build over the HST station and tunnels (it is anticipated that approximately \$860 million would be the cost of placing a protective concrete barrier over the HST structures);
- Substantial impacts to Los Gatos Creek where cut-and-cover construction would be employed;
- Require underpinning and supporting of the VTA Vasona Extension during the construction of the Shallow HST station;
- Disruption to Peninsula Corridor Joint Powers Board (Caltrain) operations during the time that surface soil improvement is placed for the tunnels crossing Caltrain tracks;
- Require reconstruction of Tamien Station similarly to the Deep Tunnel Alternative;
- Require reconstruction of SR 87 northbound on-ramp similarly to the Deep Tunnel Alternative.

This alignment would also involve trenching from the southern tunnel portal south through the Tamien Station area, which would adversely affect a National Register archaeological site and cause substantial delays in the project. Mitigation would typically require extensive archaeological field work and burial removal.

Along with the SR 87/I-280 Alignment Alternative, it would be the longest in distance and slowest in journey time. Because it would be in a tunnel, it would have the highest operating and capital cost factors similarly to the Deep Tunnel Alternative. It presents construction challenges and would require additional right-of-way, earth stabilization work, crossing Los Gatos Creek, crossing VTA, and crossing under Caltrain. Similar to the Deep Tunnel Alignment Alternative, there would be minimal visual effects and the noise impacts would be associated with the ventilation facilities.

The Shallow Tunnel Alignment Alternative is **withdrawn from further consideration** because it is impracticable due to major constructability issues, surface disruption to surface land uses, additional right-of-way requirements, limits to future development, the relocation and redesign of the proposed BART Diridion Station and associated tunnels along with much greater construction risk, impacts to Los Gatos Creek, impacts to VTA and Caltrain, high cost factors, and lengthy construction schedules and construction impacts.

Downtown Aerial Alignment Alternative would be the same length as the Deep Tunnel Alignment Alternative and would have the second fastest journey time. It would perform the best in terms of operating and capital cost factors. The alignment alternative would result in major constructability issues including the construction of high bridge structures over an existing interchange and curved long span bridges. The Downtown Aerial Alignment Alternative would potentially displace 25 to 33 additional single-family residential properties (dwelling units) and 30 to 40 additional multi-family residential dwelling units compared to the Refined PA; it would also result in 10 to 20 additional business property takes. The Downtown Aerial Alignment Alternative would result in visual intrusion due to the construction of a new aerial structure through developed neighborhoods. Finally, construction of an aerial station to the east of the existing Diridon Station could potentially affect the City's planned redevelopment of areas near Diridon Station resulting in high incompatibility with the plans and policies of the City of San Jose. Due to constructability issues, potential displacement effects, visual impacts and constraints on future development, the Downtown Aerial Alignment Alternative is **withdrawn from further consideration**.

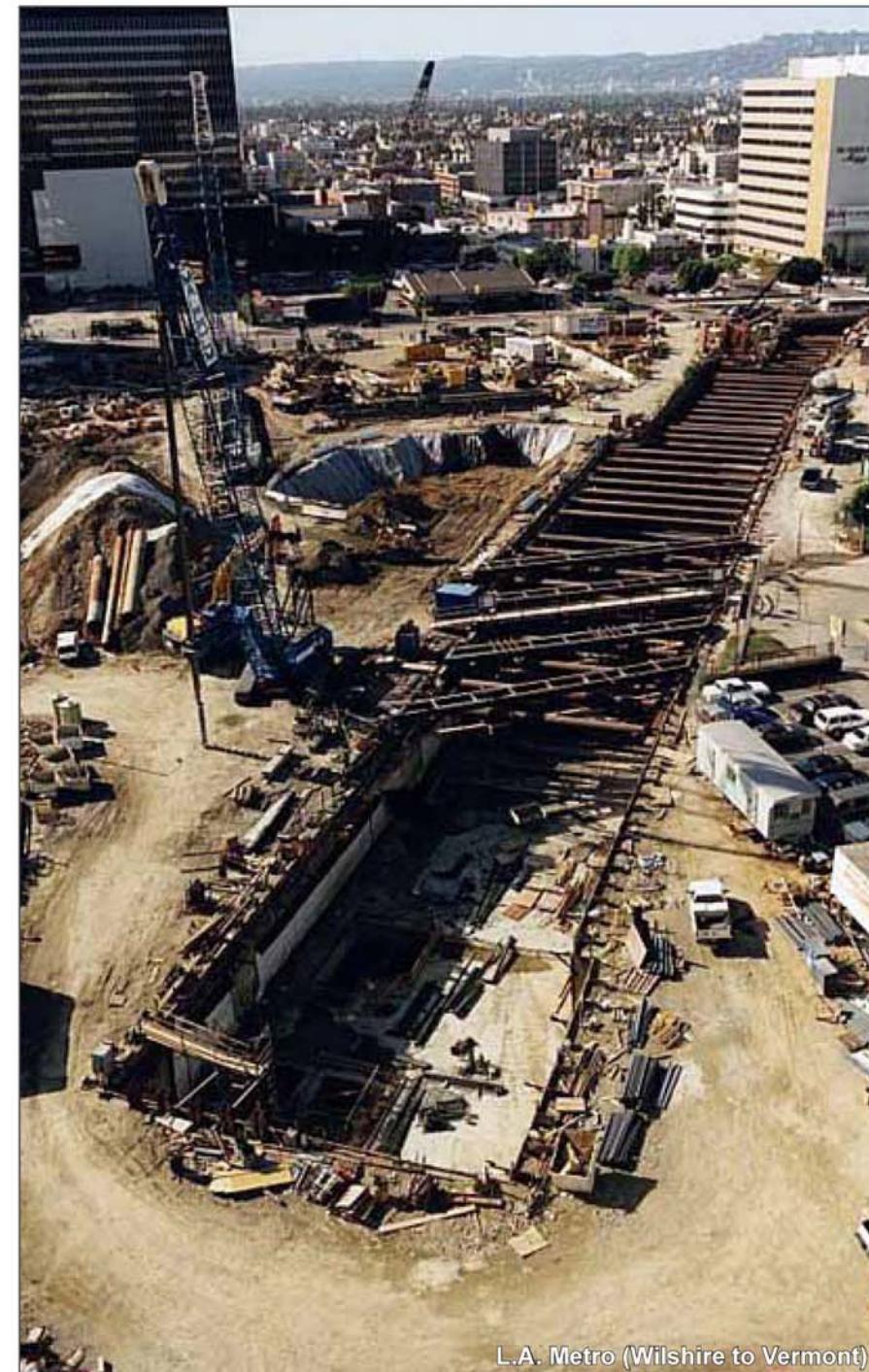
SR 87/I-280 Alignment Alternative was originally recommended by the City of San Jose in response to the City's desire to reduce impacts to the Greater Gardner/North Willow Glen community by moving the HST line away from the middle of the neighborhood (see Figure 4.1-6). Along with the Shallow Tunnel Alignment Alternative, it would have the slowest travel time. The alignment alternative would have potential constructability issues associated with constructing over the SR 87/I-280 interchange, including traffic and detour impacts on these freeways during construction. The SR 87/I-280 Alignment Alternative would move the HST alignment to the north of the Greater Gardner/North Willow neighborhood mitigating many of the community concerns. The City of San Jose has also recommended that an iconic bridge structure be considered for this alignment. This alignment is viewed by the leaders of the Greater Gardner/North Willow Glen as preferable to the Program Alignment given that it would not pass directly through the neighborhood; therefore, **it is carried forward for further study**.

Figure 4.1-4: Shallow Tunnel/Station Construction Overview

TECHNIQUES

- Construction methods south of I-280 would be similar to those identified for the downtown tunnel alignment, only shallower (depths of approximately 80 feet deep rather than 140 feet)
- Transition to cut and cover methods for the tunnel and station would occur north of I-280
- Cut and cover methods would be used for the construction and excavation of the transition sections (2–4 tracks) and station
- Portal north of Diridon Station would be cut and cover with necessary right-of-way requirements and surface impacts

In cut and cover construction, a trench is excavated and a roof is built over it. Ground modification occurs at every location where tunnels meet with cut and cover structures.



L.A. Metro (Wilshire to Vermont)

RISKS / IMPACTS

- Site preparations, including soil stabilization (where tunnels are close to the surface crossing SR 87), utility relocations, dewatering, and muck removal, would occur at all portal locations, access points, and where needed for safety
- Disruption to existing railroad (Caltrain, Amtrak, PACE, UPRR, Freight VTA-Vasona Line), traffic (vehicular, pedestrian, bicycle, bus transit), utilities, communities, residences and businesses
- Surface disruptions for access points
- Vibration
- Ground movement and settlement
- Extensive right-of-way for construction and staging
- Existing buildings need to be removed in areas of the track transition structures
- Limits on types of future development
- Land on top of the tunnel/station cannot be developed for approximately 5–7 years

Figure 4.1-5: Project Specific Requirements for "Shallow Tunnel/Station" Alignment

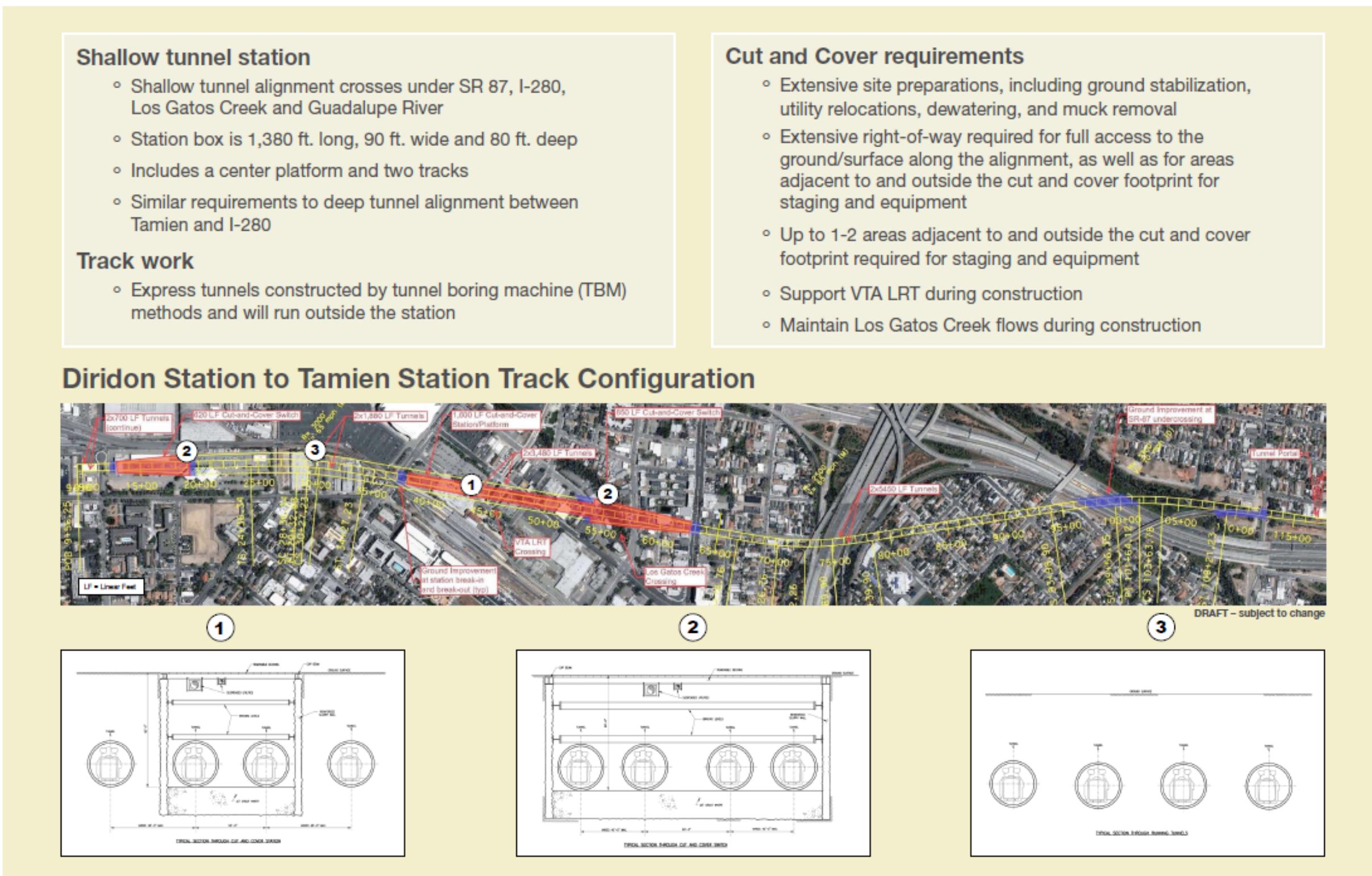
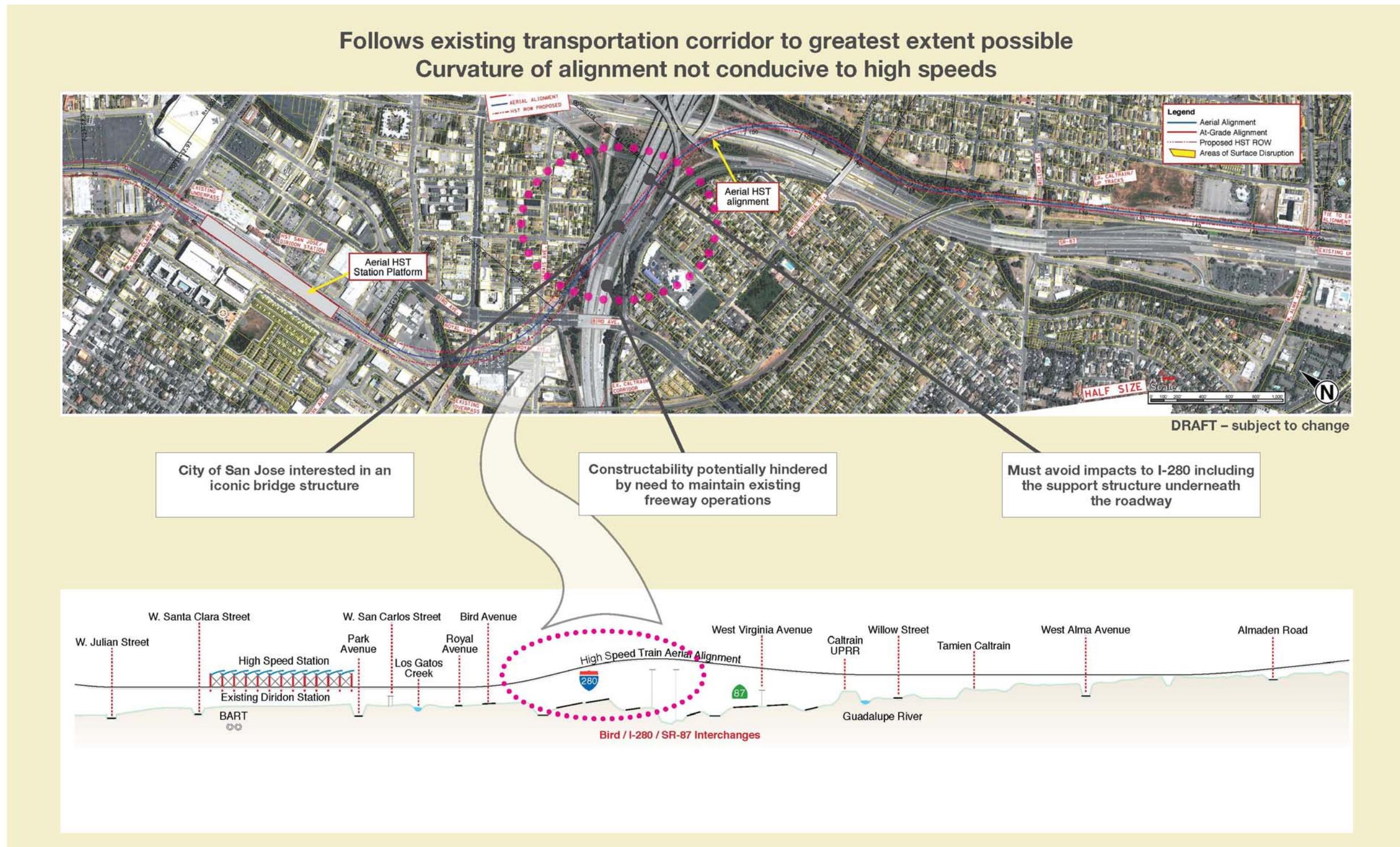


Figure 4.1-6: I-280/SR-87 Alignment Description



4.1.2 EVALUATION OF STATION LOCATION OPTIONS

Three station location options were identified to evaluate different configurations of the San Jose Station:

- Over Diridon Platforms
- Aerial Station (East of Existing Diridon Station)
- Underground Station (East of Existing Diridon Station)

The San Jose Diridon Station currently serves as a multimodal center for local, regional and intercity travel. The City of San Jose is evaluating Transit-Oriented Development (TOD) opportunities near the existing Diridon Caltrain station site and the City has assumed this station location and configuration in related planning studies. Consequently, all three station location options would be compatible with adjacent land uses. The Aerial Station (East of Existing Diridon Station) and the Underground Station (East of Existing Diridon Station) station location options would pass through the redevelopment area in a diagonal configuration potentially reducing redevelopment opportunities. The agencies and public have raised concerns for community and environmental issues in the station areas, particularly along the Guadalupe River. There is both support and opposition for the aerial and tunnel station location options.

Over Diridon Platforms station location option would result in major impacts to existing railroad operations during construction. The City of San Jose has assumed this station location and configuration in related planning studies. This station location option would not result in residential or business displacement. It potentially would affect 2.4 acres of biological resources. The aerial platforms potentially would result in visual impacts to the existing historic depot. The Over Diridon Platforms station location option is **carried forward for further consideration** because it is compatible with the SR87/I-280 alignment alternative.

Aerial Station (East of Existing Diridon Station) station location option would substantially reduce disruption to existing railroad operations when compared to the Over Diridon Platforms station location option. It would potentially affect the largest acreages of biologically sensitive habitat. This station location option would impact cultural resources including the Diridon Station and would potentially result in temporary effects to 10 acres of parkland. The aerial station would block views of the historic depot from the east resulting in slightly higher visual intrusion when compared to the Over Diridon Platforms station location option. It would potentially interfere with the City of San Jose's redevelopment plans for the areas north, east, and south of the Diridon Station. The Aerial Station (East of Existing Diridon Station) is **withdrawn from further consideration** because the Downtown Aerial alignment alternative is also withdrawn.

Underground Station (East of Existing Diridon Station) station location option would result in major constructability impacts as described in Section 4.1.1 Deep Tunnel Alignment Alternative. (see also Appendix C.) It would substantially reduce disruption to existing railroad operations when compared to the Over Diridon Platforms station location option.

It would not result in residential or nonresidential displacements. As it would be in a tunnel, there would not be impacts to sensitive biological habitat, cultural resources or the visual character of the area. The Underground Station (East of Existing Diridon Station) station location option is **withdrawn from further consideration** because the Deep and Shallow Tunnel alignment alternatives are also withdrawn.

4.1.3 RISK COMPARISON OF ALIGNMENT ALTERNATIVES AND STATION LOCATION OPTIONS

Tunneling and underground construction always carries a number of risks and uncertainties, mainly associated with the inherent variability of the geological and hydrological conditions and mechanical properties of soils in which construction takes place. The most common problems are associated with ground movements and settlements that may occur during construction of underground works as a result of elastic or inelastic relaxation of the ground when excavation relieves in situ pressures or as a result of groundwater lowering. Lowering the groundwater table can result in compaction or consolidation of surface soils. Removal of fines by seepage water or through dewatering wells can also cause settlements. Gross instability and collapse of tunnel face, shaft walls or bottom may cause surface depressions. Hence, ground movement control is a major issue for tunnels and excavations in soil in urban areas, especially if such works are performed below the groundwater table. Groundwater ranges from four to 18 feet below the ground surface (i.e., presence of a high groundwater table), construction must be water tight to prevent excessive groundwater inflows.

In terms of constructability and the current state of the art, mechanized pressurized face tunneling methods employing an Earth Pressure Balance Tunnel Boring Machine (EPBM) or Slurry Tunnel Boring Machine similar to that envisioned for construction of VTA/BART tunnels, should be used to the greatest extent possible. Sequential Excavation Methods (SEM) can be used for construction of noncircular cross-section openings (i.e., turnouts and cross passages). Construction methods such as SEM where a positive balancing pressure cannot be continuously applied at the advancing tunnel face will require ground freezing or ground modification techniques such as permeation or jet grouting to control groundwater inflows and limit surface settlement.

An evaluation of foreseeable potential risks and impacts associated with three different types of the proposed HST San Jose Tunnel/Station alternatives (i.e., "Aerial option", "Deep Mined option" and "Shallow Station/Tunnel or Cut-and-Cover option") is provided in Table 4.1-2. Seven evaluation criteria including 24 potential risk items are considered. It should be noted that weighting factors or values between each item have not been considered, and only relative degrees of impact of risks among three different options/alternatives for each item have been evaluated. The evaluation result implies that "Deep Mined option" and "Shallow Cut-and-Cover option" carry more "high" risks and less "low" risks than "Aerial option", in particular for the evaluation criteria of "cost and schedule", "constructability" and "geotechnical constraints". While "Shallow Cut-and-Cover option" has major impacts on future development and surface disruption, this option may have less constructability and few risk issues than the "deep mined option as shown in Table 4.1-2.

Table 4.1-2: Risk/Impact Evaluation Matrix for San Jose Tunnel/Station Alternatives

Evaluation Criteria		Aerial Option ¹		Deep Mined Option ²		Shallow Cut-and-Cover Option ³
Cost and Schedule	Operating Costs	L			H	M
	Capital Costs	L			H	M
	Schedule	L			H	M
Constructability	Constructability	L			H	M
	Surface Disruption		M		M	
	Disruption to Existing Railroads		M	L		
	Damage to Surface/Near Surface Structure	L			H	M
	Impact to Existing Foundations	L			H	M
	Disruption to and Relocation of Utilities	M	L			H
Geotechnical Constraints	Ground Type	L			H	M
	Settlement	L			M	L
	Flooding/Inrush of Water to the Excavation	L			H	M
	Groundwater	L			H	M
Disruption to Communities	Residential/Business Impact		M	L		
	Local Traffic Maintenance & Detour Routing		M	L		
	City Division		M	L		L
Environmental Impacts	Noise/ Vibration/ Dust		H	L		
	Visual/Aesthetic Issues		H	L		M
Environmental Resources	Biological Resources	M		L		L
	Cultural/ Archaeological Resources	L			M H	M H
Others	Emergency Response	L			H	M
	Staging	L		L		L
	Future Development	L			M	
	Right-of-way	M		M		M
Notes:						
1. SR 87/I-280 Aerial Alternative and Refined Program Alignment						
2. Deep Tunnel Option, 5100m Tunnel and Thread the Needle Tunnel						
3. Shallow Tunnel Option						

Risk/Impact Rating

L	M	H
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Low Medium High

4.2 Monterey Highway Subsection

4.2.1 EVALUATION OF ALIGNMENT ALTERNATIVES

Two alignment alternatives were identified within the Monterey Highway subsection for comparison against the evaluation measures:²

- ♦ Refined Program
- ♦ East of Caltrain/UPRR

Table 2 in Appendix B lists each of the alignment alternatives considered in the Monterey Highway Subsection and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguish among the alternatives are highlighted on the tables. The performance of the two alignment alternatives against the evaluation measures that differentiate among the alignment alternatives is described below.

Both the alignment alternatives would be generally consistent with the stated objectives of providing rapid, efficient transportation service, minimizing capital and operating costs and maximizing the use of existing transportation corridors and rights-of-way, to the extent feasible. Each of the alignment alternatives would be consistent with the City of San Jose and Santa Clara County general plans to expand public transit and other related infrastructure to improve regional and inter-regional access and to provide for a safe, efficient and technologically advanced multi-modal transportation system. They would be inconsistent with the Santa Clara Valley Transportation Authority's proposal to implement a bus rapid transit project along Monterey Highway. Each of the alignment alternatives would result in similar impacts to communities, biological and cultural resources and parklands; therefore, these evaluation measures do not differentiate between alignment alternatives.

Refined Program Alignment Alternative would begin south of the Caltrain Tamien Station at West Alma Avenue in the constrained right-of-way between State Route 87 (SR 87) and the existing Peninsula Corridor Joint Powers Board (Caltrain) railroad corridor. The alignment would be aerial from Tamien Station to just north of Almaden Expressway and would be adjacent to and west of the existing tracks. It would be east of SR 87. This alignment allows the HST corridor to be away from east side residences; however, to accomplish this, existing Caltrain and Union Pacific Railroad (UPRR) tracks from West Alma Avenue to just north of Lick would be relocated to the east closer to residences between Tamien Station and Lick. In addition, this would require private non-residential property takes to accommodate the shifting of the UPRR's Luther Siding. The UPRR's Luther Lead track would also require relocation; however, this can be accommodated within the existing UPRR right-of-way.

From just north of Almaden Expressway to just south of Curtner Avenue, the alignment would be at-grade and within the existing Caltrain right-of-way. The two HST tracks would occupy the westerly portion of the existing right-of-way. South of Curtner Avenue the alignment would begin to transition out of the Caltrain right-of-way to be on the west side but immediately adjacent to Caltrain. As the alignment approaches Lick and then Monterey Highway it rises up onto an aerial viaduct to cross over the UPRR tracks and come down into the Monterey Highway corridor just north of the Capital Expressway. From the Tamien Station to Lick the HST tracks would be separated from the UPRR by the Caltrain tracks. Private non-residential property acquisition would be required from south of Curtner Avenue to just south of Lick to accommodate the alignment outside the Caltrain right-of-way.

Once in the Monterey Highway corridor, the alignment would be at-grade and between the UPRR right-of-way and the reconstructed narrower highway. The alignment in the Monterey Highway corridor would also be the same for the East of Tamien Platform alternative. The at-grade configuration would require carefully engineered cross sections for HST and reconstructed Monterey Highway, particularly for the portion south of SR 85. The speed of curve entering Monterey Highway would be 125 mph. Along Monterey Highway, access to the UPRR from the east would be blocked by the HST between just north of Capital Expressway and Coyote. Under this alignment alternative, mature trees along Monterey Highway would be replaced with new landscaping and soundwalls.

The community expressed concern regarding this alignment alternative due to its effects on Monterey Highway (reduction from six lanes to four), landscaping plans, increased traffic congestion, and noise and vibration within the Silverleaf neighborhood. Community concerns regarding the Caltrain Tamien Station area included potential noise impacts and effects to planned parks and trails, residential areas and a day care facility. The New Horizons condominium complex requested that an at-grade rather than aerial solution be evaluated.

Refined Program Alignment Alternative is carried forward for further study; while there are engineering challenges, it allows for more efficient operation than the East of Tamien Platform alternative.

East of Caltrain/UPRR Alignment Alternative is a continuation of the Deep Tunnel and Shallow Tunnel alignment alternatives. As described in Section 4.1 San Jose Station Approach, those alternatives would require the reconstruction of the Caltrain Tamien Station and the SR 87 northbound on ramp, potentially resulting in substantial constructability impacts and disruption to the existing Caltrain railroad system and SR 87 freeway. After rising up out of the tunnel alignment at the Tamien Station, this alignment would continue to rise up onto an aerial structure south of the Tamien Station to cross over Almaden Expressway and the UPRR's Luther Industrial Lead. This portion of the alignment would be in the Caltrain right-of-way, along its east side and adjacent to the UPRR mainline track. The existing Caltrain and UPRR track would be relocated to the westerly side of the Caltrain right-of-way from south of Tamien Station to south of Curtner Avenue to accommodate the HST tracks and its aerial structure within the right-of-way. The aerial structure would also cross over the UPRR's Luther Siding.

After crossing over the Luther Lead, the alignment would come down to grade to cross under the Curtner Avenue Overhead bridge. The alignment remains at grade as it continues south and enters the Monterey Highway corridor on a relatively slow curve of 85 mph. As the alignment approaches Lick it moves to the east outside the right-of-way requiring private property acquisition. The Caltrain and UPRR tracks would return to their existing alignments at Lick.

Once in the Monterey Highway corridor it is on the same alignment as the Refined Program alternative starting just north of Capital Expressway. The community expressed concern regarding this alignment alternative due to its effects on Monterey Highway (reduction from six lanes to four), landscaping plans, increased traffic congestion, and noise and vibration within the Silverleaf neighborhood. Community concerns south of the Caltrain Tamien Station area included potential noise and visual impacts caused by the close proximity of an aerial structure located along the easterly side of the Caltrain right-of-way. East of Caltrain/UPRR Alignment Alternative is withdrawn from further consideration because it is impracticable due to constructability impacts and disruption to the existing Caltrain railroad system and SR 87 freeway as a result of reconstruction of the Caltrain Tamien Station and SR 87 northbound on-ramp. In addition, the alignment would enter the Monterey Highway corridor on a relatively slow curve of 85 mph.

4.3 Morgan Hill – Gilroy Subsection

4.3.1 EVALUATION OF ALIGNMENT ALTERNATIVES

Under this subsection, five alignment alternatives were identified for comparison against the evaluation measures:

- ♦ East of UPRR to Downtown Gilroy (Program Alignment)
- ♦ US 101 to Downtown Gilroy
- ♦ Gilroy Station Loop
- ♦ US 101 to East Gilroy
- ♦ East of UPRR to East Gilroy

Tables 3A and 3B in Appendix B list each of the alignment alternatives and station location options considered in the Morgan Hill – Gilroy Subsection and identify whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguish among the alternatives are highlighted on the tables. The performance of the five alignment alternatives against the evaluation measures is described below.

² One alignment was withdrawn early in the AA process for the Monterey Highway subsection – SR 87/85. This alignment would not meet HST criteria for curve radius; would require construction of an aerial alignment over these freeways, through a residential neighborhood, and across from a high school; and would require relocation of VTA's operating LRT line.

All the alignment alternatives generally would be consistent with the stated purpose and need of providing rapid and efficient transportation service in the Morgan Hill and Gilroy area, minimizing capital and operating costs and maximizing the use of existing transportation corridors and rights-of-way, to the extent feasible. Even so, these alignment alternatives would deviate from the existing transportation corridor and traverse some sensitive environmental areas, in addition to causing community impacts as discussed below.

As described above, these alignment alternatives would deviate from the existing transportation corridor, to varying degrees and would cross agricultural areas, floodplains and/or hills. The vast majority of the alignments would be adjacent to transportation corridors: US 101 or the UPRR right-of-way. Two of the five alignment alternatives would eliminate impacts to Downtown Gilroy. The Program Alignment, US 101 to Downtown Gilroy, and Gilroy Station Loop alternatives would pass through Downtown Gilroy and would hence cause the most impact to Downtown Gilroy. Each of the alignment alternatives has varying environmental benefits and impacts as discussed below.

Agencies and the public expressed concern for environmental and community impacts with all the alternatives. The cities of Morgan Hill and Gilroy noted both support and opposition for specific alternatives that would increase or reduce impact through their neighborhoods. All the alignment alternatives would be consistent with the City of Gilroy and Santa Clara County general plan policies to expand public transit and other related infrastructure to improve regional and inter-regional access; and provide for a safe, efficient and technologically advanced multi-modal transportation system. The East of UPRR to Downtown Gilroy, US 101 to Downtown Gilroy, and Gilroy Station Loop alignment alternatives would be consistent with plans to address infill development due to the existing downtown Gilroy Caltrain station.

East of UPRR to Downtown Gilroy (Program Alignment) Alignment Alternative, identified by the CAHSR Board in 2008 as a preferred alternative, would be predominantly adjacent to and east of the UPRR operating right-of-way and therefore would not deviate much from the existing transportation corridor. This alignment alternative would require reconstruction of a segment of Monterey Highway, just north of Capitol Expressway to north of Morgan Hill. It would be the second longest in terms of travel time (8.73 minutes). It would potentially result in 20 to 35 residential unit displacements and would have the greatest potential for business displacement (25 to 40 units). Potential impacts to biological resources, cultural resources, and farmlands would be relatively high. This alignment alternative would require passing over or under some UPRR non-operating right-of-way near Coyote, in Morgan Hill, San Martin, and Gilroy. Union Pacific has stated in written letters that it will not willingly provide this right-of-way. The East of UPRR to Downtown Gilroy (PA) Alignment Alternative is **carried forward for further consideration** because it would be adjacent to and east of the UPRR right-of-way, fulfilling the CAHSR Board directive to follow existing transportation corridors to the extent possible in addition to being identified as Preferred by the CAHSR Board in 2008.

US 101 to Downtown Gilroy Alignment Alternative was developed in response to input from the City of Morgan Hill because it would remove the aerial alignment from downtown Morgan Hill. This is the longest alternative in terms of length/distance (32.10 miles) and journey time (8.75 minutes). It is one of the most costly alignment alternatives in terms of capital and operating costs. It would potentially result in ten additional residential property takes (dwelling units) compared to the Program Alignment (PA). Potential impacts to biological resources, farmlands and cultural resources would be relatively high. Considerable visual impacts would occur due to this alternative. This alternative would include an aerial structure that would minimize impacts to wildlife crossings in the sensitive habitat areas of Coyote Valley. The US 101 to Downtown Gilroy Alignment Alternative is **carried forward for further consideration** because it would remove an aerial alignment from downtown Morgan Hill and would provide an aerial structure for wildlife crossings in the sensitive Coyote Valley area.

Gilroy Station Loop Alignment Alternative would provide two separate station tracks looping from the US 101 to East Gilroy Alignment into a station in Downtown Gilroy. This alignment alternative would have a capital cost factor 36 percent more costly than the PA. Along with the US 101 to East Gilroy Alignment Alternative, it would have the shortest journey time (8.34 minutes) and route length (30.58 miles). It would potentially require five to 15 additional residential property takes (dwelling units) compared to the PA. Potential impacts to cultural resources would be relatively high. A unique feature of this alignment is that it would have community impacts on two areas: both the east of US 101 and downtown Gilroy areas. This alignment alternative would require passing over or under some UPRR non-operating right-of-way near Coyote, in Morgan Hill, San Martin, and Gilroy. Union Pacific has stated in written letters that it will not willingly provide this right-of-way. The City of Gilroy prefers a downtown station if it is in a trench, and agrees that a two-track system in downtown Gilroy would have fewer right-of-way impacts. Moreover,

this alignment alternative would have additional visual impacts due to the need for one HST track to pass over the two mainlines at both north and south of Gilroy and pass over US 101 north of Gilroy. Additionally, concern has been expressed that a Gilroy station could be postponed or eliminated under this alignment alternative, with the express tracks built in advance of the station loop. The Gilroy Station Loop Alignment Alternative is **withdrawn from further consideration** because of greater environmental impacts including potential residential and business displacement, and increased visual impacts, as well as potential delays in construction or deferral of the Downtown Gilroy Station. It would also have high capital costs.

US 101 to East Gilroy Alignment Alternative would traverse east of Gilroy thereby eliminating impacts to Downtown Gilroy. It potentially would result in 15 to 25 residential dwelling unit displacements, among the lowest and the least business displacements. The alignment alternative would be among the higher performing alignment alternatives for biological resources. An elevated section near Coyote would also enable better wildlife passage compared to the PA. The US 101 to East Gilroy Alignment Alternative is **carried forward for further consideration** because it would reduce impacts to Downtown Gilroy and would result in relatively fewer impacts to biological resources.

East of UPRR to East Gilroy Alignment Alternative would traverse east of Gilroy thereby eliminating impacts to Downtown Gilroy. Impacts associated with Downtown Morgan Hill would remain. It potentially would result in fewer residential dwelling unit displacements (20 to 30) and business displacements (5 to 15) when compared to the PA. The alignment alternative would have relatively moderate potential to affect biological, cultural and farmland resources compared to the other alignment alternatives. This alignment alternative would require passing over or under some UPRR non-operating right-of-way near Coyote, in Morgan Hill, and in San Martin. Union Pacific has stated in written letters that it will not willingly provide this right-of-way. The East of UPRR/East of Gilroy Alignment is **carried forward for further consideration** because of potential to reduce displacements and some of the biological, cultural and agricultural resources.

4.3.2 EVALUATION OF DESIGN OPTIONS

One design option was evaluated in Downtown Gilroy:

- ♦ Downtown Gilroy: HST Trench

In most cases, the evaluation criteria fall under the discussions for the PA or are not differentiating factors; those that differ are presented below.

Downtown Gilroy: HST Trench Design Option was developed in response to the City of Gilroy's request that the HST and UPRR be placed in a trench. The HST trench excluding the UPRR would be 125-feet wide at the widest section and over three (3) miles long to accommodate four tracks and a station. Including UPRR in the trench would increase the trench length to five miles and its width to 185 feet. It would require use of UPRR operating right-of-way. The Trench design option (without the UPRR) would have the higher capital cost factor and would add nine percent to the cost of the total subsection alignment costs. Including the UPRR in the trench would increase this cost factor. The Trench design option would be the most complicated option to construct because it would entail difficult below-grade structural construction. Rather than intrude visually with an aerial structure, the trench would place the track below grade and out-of-sight. The Downtown Gilroy: HST Trench Design Option is **carried forward for further consideration** in response to the City of Gilroy to reduce visual impacts in Downtown Gilroy.

4.3.3 EVALUATION OF STATION LOCATION OPTIONS

Under this subsection, five station location options were identified for comparison against the evaluation measures:

- ♦ Morgan Hill Downtown (Four-Track)
- ♦ Downtown Gilroy (Four-Track)
- ♦ Downtown Gilroy (Two-Track)
- ♦ East Gilroy (Four-Track)
- ♦ Morgan Hill US 101 at Cochrane (Four-Track)

Many of the evaluation factors analyzed under the alignment alternatives apply to these station location options; where there are differentiating factors, they are described below. The Morgan Hill and Downtown Gilroy station location options are currently served by existing transit systems. All station location options would be compatible with TOD objectives to varying degrees and would have the potential to affect local station area traffic to some extent.

Morgan Hill Downtown (Four-Track) Station would result in impacts to existing Caltrain parking during construction. It would potentially involve up to two business displacements. It would require among the fewer takings of biological and cultural resources and would not require parkland or agricultural land. It would require a large parking structure in the downtown area, resulting in major visual intrusion. This station would allow for interconnectivity with proposed train service from Monterey County to the south. The Morgan Hill Station: Downtown Station Location Option **is withdrawn from further consideration** because the City of Morgan Hill did not want an aerial alignment through Downtown Morgan Hill. In addition, a joint resolution between the cities of Morgan Hill and Gilroy states a preference for a HST station in Gilroy because it would better serve the travel shed in the counties to the south.

Downtown Gilroy (Four-Track) Station would result in minor impacts to the Caltrain storage track. It would potentially involve up to two displacements and would require among the fewer takings of biological resources; however, the Gilroy Station is likely to be eligible for the National Register of Historic Places. The aerial structure and a large parking garage would result in visual intrusion in the downtown area. This station would allow for interconnectivity with proposed train service from Monterey County to the south. This station location works with the alternative alignments being carried forward and **is carried forward for further consideration**.

Downtown Gilroy (Two-Track) Station would require relocation of the Caltrain storage track and result in few displacements. It would require among the fewer takings of biological resources; however, the Gilroy Station is likely to be eligible for the National Register. The station location option would not require the permanent use of parkland or agricultural land. The aerial structure and a large parking garage would result in visual intrusion in the downtown area. This station would allow for interconnectivity with proposed train service from Monterey County to the south. This station location **is withdrawn from further consideration** because the Gilroy Station Loop alignment alternative is withdrawn.

East Gilroy (Four-Track) Station would not disrupt existing station service during construction. It would potentially require up to one residential displacement but would affect among the most biological and agricultural resources. Its location in an agricultural area would result in major visual intrusion. This station would not allow for direct interconnectivity with proposed train service from Monterey County to the south. This station location works with the alternative alignments being carried forward and **is also carried forward for further consideration**.

Morgan Hill US 101 at Cochrane (Four-Track) Station would not disrupt existing Caltrain station service. It would potentially displace up to one residential unit. It would not require any cultural resources but seven (7) acres of agricultural lands of status. The station location option would be visually compatible with the surrounding development (big box retail). This station would not allow for direct interconnectivity with proposed train service from Monterey County to the south. The Morgan Hill US 101 at Cochrane Station Location Option **is withdrawn from further consideration** because a joint resolution between the cities of Morgan Hill and Gilroy states a preference for a HST station in Gilroy because it would better serve the travel shed in the counties to the south.

4.4 Pacheco Pass Subsection

The CAHST Pacheco Pass Subsection from Casa de Fruta to I-5 involves crossing Pacheco Pass, which includes steep terrain, narrow valleys and major engineering challenges. The Quantm computer model was used to assist in identifying viable routes over the pass (see Appendix D: Alternative Alignment Development Quantm Report). Quantm provides an iterative process to identify alignments that meet defined criteria and HST engineering standards using actual digital geographic data. The model is also provided with "areas to avoid" including environmentally sensitive areas, parklands, established development and other geographic features. In effect, the model optimizes and balances earthwork (cuts and fills) based on the constraints to yield a cost effective alignment.

Quantm returned 50 least costly possibilities of each alignment variation; of these, a single alignment alternative was identified that met the criteria of constructability, geometric alignment, and cost effectiveness. That alignment was called the Refined Program Alignment because it had similarities to the original program alignment, although it was based on updated geometric criteria. Of the alignments computed by Quantm, many were discarded due primarily to bridge heights in excess of 500 feet, some even as high as 900 feet. The engineering design team deemed bridge heights in excess of 300 feet as having a fatal flaw. Other alignments generated were eliminated from consideration because they encroached onto environmentally sensitive areas such as the San Luis Reservoir and State Recreation Area, San Joaquin National Cemetery, Pacheco State Park and Mt. Hamilton (The Nature Conservancy).

Utilizing information from the Quantm study, a second alignment was subsequently proposed that diverged from the Refined Program Alignment at the crest of Pacheco Pass and followed close to SR 152 at San Luis Reservoir. It rejoined the Refined Program Alignment just east of the San Joaquin National Cemetery and was named the "Close Proximity to SR 152 Alignment". For purposes of this evaluation, the "Close Proximity to SR 152 Alignment" alternative includes both the divergence area and the common alignment shared with the Refined Program Alignment.

There are eight tunnels in both alignment alternatives to maintain the grades across the Pacheco Pass. The total length of the Refined Program Alignment tunnels is approximately 53,575 feet. The total length of the Close Proximity to SR 152 Alignment tunnels is approximately 49,775 feet, or about 3,800 feet shorter. The longest tunnel is 22,700 feet long, and three tunnels would be shorter than 1,000 feet.

4.4.1 EVALUATION OF ALIGNMENT ALTERNATIVES

Table 4 in Appendix B lists each of alignment alternatives considered in the Pacheco Pass Subsection and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguish among the alternatives are highlighted on the tables. The performance of the two alignment alternatives against the evaluation measures that differentiate among the alignment alternatives is described below.

Both of the alignment alternatives were generally consistent with the stated objectives of providing rapid, efficient transportation service. As described above, the crossing of Pacheco Pass presents extreme engineering challenges. Each of the alignment alternatives has varying environmental issues as discussed below.

Refined Program Alignment Alternative was developed using Quantm as a basis for further profile alignments to create the most viable route across Pacheco Pass that would minimize environmental impacts while maintaining a practicable alignment which meets desired design characteristics. The major advantage to the Refined Program Alternative is a conformance to all of the criteria for grades, curves, tunnel length and bridge height. There would be no relocations associated with this alignment and the visual impacts would be evident, but moderate. Potential impacts to biological resources, parkland and important farmland would be high; however, the alignment would be designed to minimize these potential impacts. Table 4 in Appendix B identifies environmental resources impacts avoided due to the alignment alternative being within tunnel. The Refined Program Alignment has a shared common alignment for the area west of the peak of Pacheco Pass. Based on this analysis, the Refined Program Alignment Alternative **is carried forward into further evaluation** to enable additional review of such factors as impacts from construction and maintenance access roads from SR 152 to the right-of-way; impacts on the use of Cottonwood Creek Wildlife Area including hunting; and overall environmental impacts.

Close Proximity to SR 152 Alignment Alternative would be the closest alignment to the existing transportation corridor (SR 152). The alignment alternative was suggested and evaluated as a way to reduce land disturbance due to construction and maintenance access roads from SR 152 to the right-of-way; minimize the total land disturbance impact on the Cottonwood Creek Wildlife Area; and to keep the railway closer to SR 152 which would reduce the impact on hunting in the Cottonwood Creek Wildlife Area, as well as meeting the Authority's design criteria of staying as close to existing transportation corridors as feasible. The Close Proximity to SR 152 Alignment would be easier to construct due to staging adjacent to the highway. It would reduce tunnel access road impacts and would perform well in terms of constructability, with no fatal flaws. It would be the shortest of the alignments and fastest. It would be the most economical in terms of operating and capital cost factors due to a shorter tunnel east of San Luis Reservoir.

This alignment, like the Refined Program Alignment, crosses the San Luis Reservoir on an embankment to avoid seismic design issues associated with the Ortigalita fault. This approach is consistent with the Authority's design criteria for fault crossings. There would be no displacements and the visual effects would be moderate. This alignment alternative minimizes impacts to the Upper Cottonwood Creek Wildlife Area by placing the HST as close to SR 152 as possible without violating HST design standards. This limits the HST's intrusion into the wildlife area and minimizes the length of the access roads that must be provided to access each tunnel portal. There are no significant differences between this alignment and the Refined Program Alignment with regards to impact on biological resources or sensitive habitat. Table 4 in Appendix B identifies environmental resources impacts avoided due to the alignment alternative being within tunnel. While this alignment could have increased potential environmental impacts, principally due to the fact that it could result in an overall shorter length of tunnels, the Close Proximity to SR 152 Alignment Alternative best meets the Authority's objective of following existing transportation corridors and is carried forward into further evaluation.

4.5 San Joaquin Valley Crossing Subsection

4.5.1 EVALUATION OF ALIGNMENT ALTERNATIVES

Within the San Joaquin Valley Crossing subsection, six alignment alternatives were identified for comparison against the evaluation.³

- Henry Miller Road to Avenue 24 (Revised Program Alignment)
- SR 140
- South of GEA
- Henry Miller Road to SR 152
- Henry Miller Road to Avenue 22
- Henry Miller Road to Avenue 21

Table 5 in Appendix B lists each of the alignment alternatives considered in the San Joaquin Valley Crossing Subsection and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguish among the alternatives are highlighted on the tables. The performance of the six alignment alternatives against the evaluation measures that differentiate among the alignment alternatives is described below.

All the alignment alternatives would be generally consistent with the purpose and need for the project in that they would provide fast, efficient transportation service. They also would be consistent with the Merced County General Plan in that they encourage the movement of people, goods and services through non-automotive transportation, reducing traffic congestion, air pollution, energy consumption and the costs of personal transportation. They would provide for development potential of vacant parcels within communities and would provide opportunities to

accommodate the specialized needs of the traveling public balanced with circulation and other County needs. They would be somewhat inconsistent in that they could encourage construction in sensitive biological habitats. The alignment alternatives received opposition in terms of concerns for community and environmental impacts and some support for providing transportation options. Each of the six alignment alternatives would have community and environmental benefits and impacts, as described below.

Henry Miller Road to Avenue 24 (Revised Program Alignment Alternative) was developed to refine the Program Alignment that was adopted by the CAHSR Board in 2008. It would be the least costly of the Henry Miller alignment alternatives with a capital cost factor 30 percent greater than that of the least costly SR 140 alignment alternative. This alternative would result in the fewest residential displacements. However, the impacts of the wye on the City of Chowchilla are more severe. Henry Miller Road to Avenue 24 is carried forward for further consideration to further compare the impacts of this alignment on Chowchilla with the impacts of alignments in the Ave 21 corridor for both the Merced to Fresno and the San Jose to Merced sections.

SR 140 Alignment Alternative would add four (4) minutes travel time between San Francisco and Los Angeles when compared to the Revised Program Alignment Alternative (PA), likely making it incompatible with the travel time requirements in Proposition 1A of 2 hours and 40 minutes between Los Angeles Union Station and the Transbay Terminal in San Francisco. It would be the least costly alignment alternative to Merced due to its shorter length. This alternative would result in the greatest potential for residential displacements, particularly as the alignment approaches Merced and Atwater, resulting in 27 to 34 additional residential property takes (dwelling units) compared to the PA. It would also result in the greatest potential for nonresidential displacements. Although this alignment was designed to be an environmental mitigation alternative, it would still result in considerable biological and parkland impacts, and still bisect the GEA. The SR 140 Alignment Alternative would involve the largest number of agricultural lands of status and would also result in farmland severance in locations where the alignment is away from SR 140. A high-speed train river crossing within a state park would be required under this alignment alternative, resulting in high visual intrusiveness. Because the SR 140 Alignment Alternative is inconsistent with Proposition 1A and does not meet the project's purpose and need due to its increased travel time as well as its high level of impact to residential areas, particularly as the alignment approaches Merced and Atwater, this alignment alternative is withdrawn from further consideration.

South of GEA Alignment Alternative would add 14 additional minutes travel time between San Jose and Merced when compared to the PA, resulting in reduced ridership between stations between San Francisco and Sacramento. It also would add 20 additional HST miles with associated environmental impacts and costs. It would be the most costly alignment alternative, with a capital cost factor 2.1 times more costly than the least costly SR 140 alignment. It would perform the best in terms of constructability due to low grading. This alternative would potentially displace the second most residential units. Due to the length of this alignment alternative, it would potentially impact the greatest number of acres of environmentally sensitive habitat, including California tiger salamander, San Joaquin kit fox, California red-legged frog, and vernal pool complexes. The South of GEA Alignment Alternative is withdrawn from further consideration due to its higher environmental impacts, residential displacements and high costs.

For the selection or withdrawal of the Henry Miller east-west alternatives (i.e., Avenue 24, SR152, Avenue 22, and Avenue 21), the impacts and characteristics of the wye connection to the Central Valley alignments is critical. See (see *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*).

Henry Miller to SR 152 Alignment Alternative built on the north side of SR 152 would cost generally the same as Avenue 22, but would involve two miles of additional length of structure. The median of SR 152 for the eastern portion of the alignment leading to the wye is too narrow for the HST alignment; therefore, if the HST alignment were to be built in the median, it would result in the reconstruction of 14 miles of expressway (SR 152). This alignment alternative would displace 10 to 20 residential dwelling units. It would not directly affect any publicly-owned lands/parklands. This alignment alternative would have some of the least effect on biological resources and important farmlands. The Henry Miller to SR 152 Alignment Alternative is withdrawn from further study because it is impracticable due to constructibility issues regarding the reconstruction of SR 152 and to the effects of the wye on the City of Chowchilla (see *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*).

³ One alignment was withdrawn early in the AA process in the San Joaquin Valley Crossing Subsection: East of Los Banos to SR 152. This alignment would have additional environmental effects on the Grassland Ecological Area as it would introduce an additional corridor with the new crossing to SR 152. It also was not supported by local officials in the City of Los Banos due to possible impacts to existing and proposed City facilities.

Henry Miller Road to Avenue 22 Alignment Alternative was originally developed in response to the City of Chowchilla's concern about impacts of the wye on the city. However, more recent reviews of the wye options show that these impacts are even further reduced by use of Avenue 21 (see *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*). By bringing the east-west HST line south to Avenue 22, the junction with the Merced to Fresno HST Section would occur in the agricultural area midway between Chowchilla; and therefore, would reduce impacts on the developed areas around the city. Potential impacts to sensitive biological habitat, parklands and cultural resources would be comparable to that of the Henry Miller to Avenue 21 Alignment Alternative; however, it would potentially result in 10 to 15 additional residential displacements as compared to Avenue 21. Due to the remaining impacts of the wye on the city of Chowchilla (See *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*), the Henry Miller Road to Avenue 22 Alignment Alternative is **withdrawn from further consideration**.

Henry Miller to Avenue 21 Alignment Alternative was developed as a refinement of the Avenue 22 Alternative following local agency input, as an alternative alignment running east-west near Avenue 21 that would allow a wye with the Merced to Fresno HST alignment alternatives. The Avenue 21 Alternative resulted in fewer impacts on the Chowchilla airport, existing and proposed development, a proposed major sewer line, a new museum in Fairmead and the Fairmead landfill site, compared to the Avenue 22 alignment alternative. It would deviate from the Program Alignment at the end of Henry Miller Avenue and would involve eight more grade separations compared to the PA before it descends back to grade and curves to align with Avenue 21 ending at the wye (junction) with the Merced to Fresno corridor. This alternative alignment would affect 81 additional acres of farmlands compared to the PA. Henry Miller Road to Avenue 21 Alternative Alignment is **carried forward for further consideration** since it responds to local agencies concerns and reduces impacts of the wye and would not directly affect any publicly-owned lands.

4.6 Wye to Merced Subsection

This evaluation of the Wye to Merced subsection is based on information contained in the *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*, April 2010. Subsequently, this subsection has undergone further analysis including the identification of an additional wye location at Avenue 21. The updated analysis and wye configuration will be addressed in the next round of review.

The HST San Jose to Merced Section would connect to the Merced to Fresno Section to the east via a railroad wye. A wye is where train tracks branch off a main line to continue in different directions, forming a "Y"-like formation. In this case, the two tracks traveling east-west must become four tracks: a set of two tracks branching northbound and a set of two tracks branching southbound. The location of this wye connection may influence the selection of the route traveling east-west between San Jose and Merced and north-south between Merced and Fresno.

4.6.1 EVALUATION OF ALIGNMENT ALTERNATIVES WITH WYE CONNECTIONS

Four north-south alignment alternatives were identified for comparison against the evaluation measures in the *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*:

- ◆ A-1 BNSF
- ◆ A-2 UPRR
- ◆ A-3 West of UPRR
- ◆ A-4 UPRR/BNSF

The *Merced to Fresno AA* compares the four north-south alignment alternatives with wye connection options: Ave 24 Wye, SR152 Wye, South SR152 Wye, and SGEA Wye. The AA identifies two of these north-south alignments to be carried forward: A-1 BNSF and A-2 UPRR.

4.6.2 SUMMARY OF STATION OPTIONS RESULTS

Three station location options were evaluated to serve the City of Merced:

- ◆ Castle Commerce Center
- ◆ Downtown Merced Intermodal Transit Center
- ◆ Merced Amtrak Depot

The *Merced to Fresno AA* identifies Downtown Merced Intermodal Transit Station to be carried forward.

5.0 ANALYSIS SUMMARY AND CONCLUSIONS

Chapter 5.0 documents the conclusions and decisions regarding which alignment alternatives, station location and design options should be carried forward for analysis in the EIS/EIR based on the results of the Alternatives Analysis (AA) process including input from agencies, other stakeholders and the public. It documents the final step in the alternatives analysis process: Identification of Alternatives to be Carried Forward for Evaluation in the EIR/EIS.

5.1 Alignment Alternatives, Station Location and Design Options to be Carried Forward to EIR/EIS

Table 5.1-1 and Figure 5.1-1 identify the alignment alternatives, station location and design options to be carried forward for evaluation in the EIR/EIS. The table summarizes by alignment alternative within each subsection the proposed decisions regarding the withdrawal or carrying forward of the alignment into the EIS/EIR. Solid lines on the figure indicate that the alignment alternative and station location option is to be carried forward. Dashed lines indicate that the alignment and station location option is withdrawn. The recommendations of the Preliminary Alternatives Analysis Report are summarized below.

5.1.1 SAN JOSE STATION APPROACH SUBSECTION

Under the San Jose Station Approach subsection, seven alignment alternatives were identified for comparison against the evaluation measures:¹

- Refined Program
- South of Caltrain Tracks
- Three Track
- Deep Tunnel
- Shallow Tunnel
- Downtown Aerial
- SR 87/I-280

In addition, three station location options were identified to evaluate different configurations of the San Jose Station.

- Over Diridon Platforms
- Aerial Station East of Existing Diridon Station
- Underground Station East of Existing Diridon Station

The performance of the seven alignment alternatives against the evaluation measures is described below.

ALIGNMENT ALTERNATIVES

Refined Program Alignment Alternative was developed to refine the 2008 Program Alignment (PA) to maximize use of the existing Caltrain right-of-way, satisfying the Authority's major objective of following existing transportation corridors to the greatest extent possible as stated in the purpose and need statement. In most locations south of the Diridon Station, the existing right-of-way, owned by Caltrain, can accommodate two tracks for Caltrain/UPRR and two tracks for the HST. The Gardner neighborhood has raised major concerns regarding the impacts of this alignment on the local community, including among others noise/vibration, community cohesion, traffic, safety, visual, construction impacts, and impacts on Fuller Park and a house of worship (nonprofit). Along with the South of Caltrain Tracks, Three Track and Downtown Aerial alignment alternatives, it would have the lowest capital cost factor. This alignment alternative potentially would result in moderate impacts to biologically sensitive areas and cultural resources. Because the Refined Program Alignment Alternative would have more substantial impacts on the Greater

Gardner/North Willow Glen neighborhood than the other alternatives for this subsection and there is considerable local opposition to this alternative, this alignment alternative is **withdrawn from further consideration**.

South of Caltrain Tracks Alignment Alternative would not be within the Caltrain right-of-way to the same extent as the Refined PA and would result in approximately 10 to 18 additional residential property takes (dwelling units) compared to the Refined PA. The alignment alternative would potentially affect one house of worship (nonprofit). It would result in major visual impact where the HST tracks would traverse Fuller Park and potentially would permanently acquire approximately 1.3 acres of the park. The alignment alternative would result in fewer impacts to biological resources and about the same cultural resources impacts when compared to the Refined PA. The South of Caltrain Tracks alignment alternative is **withdrawn from further evaluation** because it would not be in the Caltrain right-of-way to the extent of the Refined PA and would require acquisition of a greater number of developed parcels than the Refined PA.

Three Track Alignment Alternative would require the reduction from two Caltrain/UPRR tracks to one, resulting in unacceptable operating constraints for Caltrain, UPRR and other passenger and freight rail systems using the Caltrain corridor. This disruption to existing railroad operations is fully inconsistent with the Caltrain operating plan and constitutes a fatal flaw for this alignment alternative; therefore, this alignment alternative is **withdrawn from further consideration**.

Deep Tunnel Alignment Alternative is impracticable due to its very high construction risks and costs – seven times higher than the costs for the Refined PA. This type of station construction is not under consideration for any of the stations in the 800-mile California HST system and has not been used for any HST Station in the world. Subsurface HST stations are constructed using cut-and-cover techniques rather than mining. Existing HST stations were constructed using cut-and-cover techniques (e.g., HST stations in Taiwan, Berlin Central Station) or the pipe roof arch method and "sheeted trench" method (e.g., Antwerp HST station in Belgium) rather than traditional mining methods. In addition, all tunnel alternatives would have higher operating costs (ventilation, pumps, lighting, stairs and elevators, etc.), costlier fire prevention, and greater time required for emergency response (in case of a fire). This alignment would also involve trenching from the southern tunnel portal south through the Tamien Station area. This would adversely affect a National Register archaeological site and cause substantial delays in the project. Mitigation would typically require extensive archaeological field work and burial removal.

The Deep Tunnel Alignment Alternative would have the fastest journey time (0.88 minutes) of all seven of the alignment alternatives within the San Jose Station Approach subsection. The Deep Tunnel Alignment Alternative is impracticable since it would result in critical risks due to ground conditions, have major constructability issues, significant impacts to a National Register archaeological site, lengthy construction schedule, and substantial capital cost. This alignment alternative is **withdrawn from further consideration**.

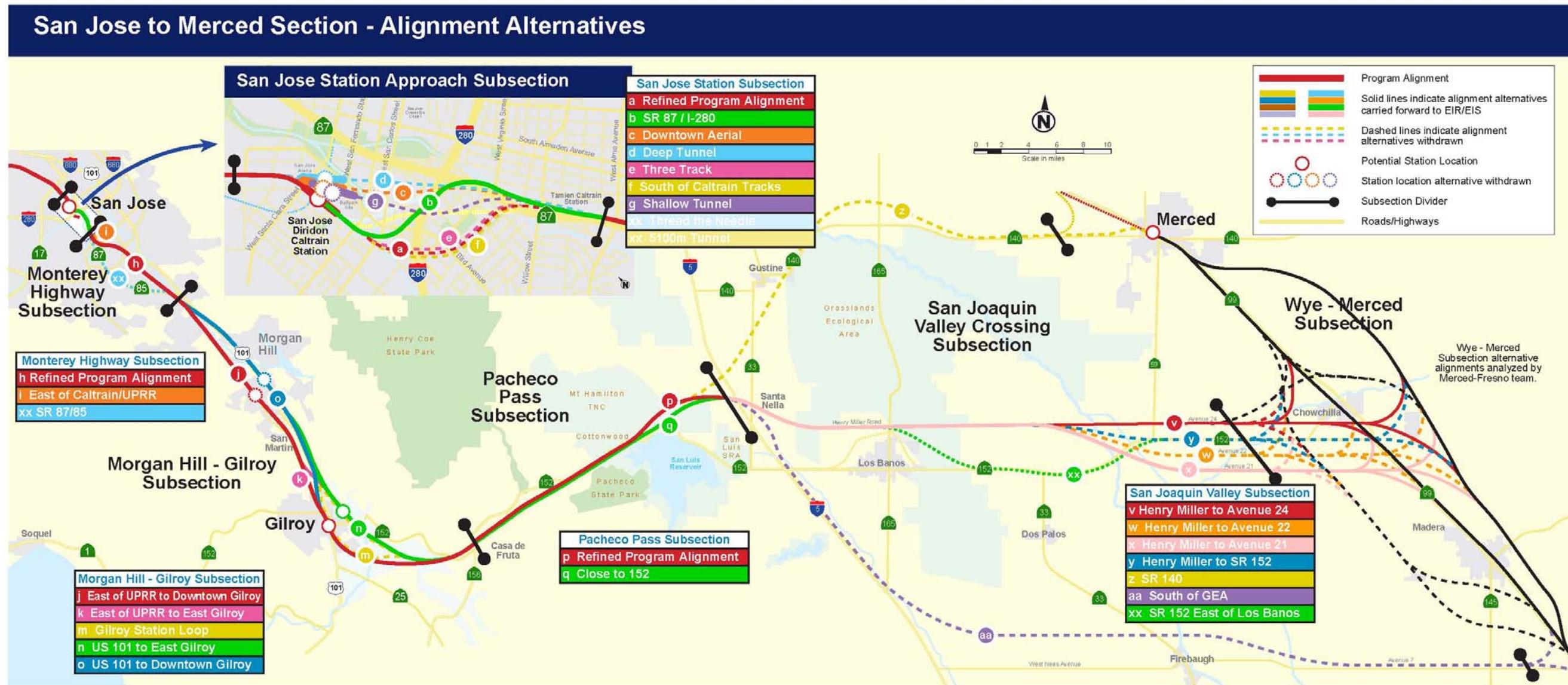
Shallow Tunnel Alignment Alternative would meet the community objective of minimizing disruption to the Greater Gardner/North Willow Glen neighborhood. The alternative does have less construction risks and lower construction costs than the Deep Tunnel Alignment Alternative but there are other factors that make this alternative impracticable. The major factors include the necessity for additional right-of-way; reconfiguration of proposed BART Silicon Valley; ground stabilization; disruption to surface existing and planned land uses; substantial impacts to Los Gatos Creek; disruption to VTA Vasona Extension and Caltrain; reconstruction of Tamien Station and SR 87 northbound on-ramp. This alignment would also involve trenching from the southern tunnel portal south through the Tamien Station area, which would adversely affect a National Register archaeological site and cause substantial delays in the project. Mitigation would typically require extensive archaeological field work and burial removal. Along with the SR 87/I-280 Alignment Alternative, it would be the longest in distance and slowest in journey time. Because it would be in a tunnel, it would have the highest operating and capital cost factors similarly to the Deep Tunnel Alternative. It presents construction challenges and would require additional right-of-way, earth stabilization work, crossing Los Gatos Creek, crossing VTA, and crossing under Caltrain. Similar to the Deep Tunnel Alignment Alternative, there would be minimal visual effects and the noise impacts would be associated with the ventilation facilities. The Shallow Tunnel Alignment Alternative is **withdrawn from further consideration** because it is impracticable due to major constructability issues, surface disruption to surface land uses, additional right-of-way requirements, limits to future development, the relocation and redesign of the proposed BART Diridon Station and associated tunnels along with greater construction risk, impacts to Los Gatos Creek, impacts to VTA and Caltrain, high cost factors, and lengthy construction schedules and construction impacts.

¹Two alignments were withdrawn early in the AA process for the San Jose Station Approach subsection: (1) Voices of San Jose 5,100 Meter Tunnel, and (2) Voices of San Jose Thread the Needle Tunnel. These tunnel proposals would involve construction of a deep subsurface station and alignment under the active Diridon Station freight and passenger tracks with the associated constructability and cost issues. The Project Team met with representatives of the Greater Gardner/Willow Glen neighborhood who agreed that the tunnel alignment recommended by the City of San Jose would be more practicable and would serve the same goals as the other proposed tunnels; therefore, those two Voices of San Jose tunnel concepts were dropped.

Table 5.1-1: Alignment Alternatives and Station Location Options Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION						ENVIRONMENTAL/OTHER CONCERNS			
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/Accessibility	Revenue/Ridership	Alignment Eliminated*				
San Jose Station Approach Subsection												
Refined Program Alignment		X		P	S				Residential displacement; Nonprofit impact; Biological, cultural and parkland resources; Community concerns			
South of Caltrain Tracks		X			P				P Residential/business displacement; Biological, cultural, visual and parkland resources			
Three Track		X		P					Fully inconsistent with Caltrain Operating Plan			
Deep Tunnel		X	P						S Business displacement; Cultural resources; Construction impacts; Substantial costs			
Shallow Tunnel		X	P	S	P				S Business displacement; Biological and cultural resources; Disruption to existing railroads; Construction impacts; Substantial costs			
Downtown Aerial		X	P	P					P Residential/ business displacement; Biological, cultural and visual resources; Community concerns			
SR 87/I-280	X								Business displacement; Biological, cultural and parkland resources			
Station Location Options												
San Jose HST Station: Over Diridon Platforms	X								Biological and visual resources			
San Jose HST Station: Aerial Station East of Existing Diridon Station		X						P	Biological, cultural, visual and parkland resources			
San Jose HST Station: Underground Station East of Existing Diridon Station		X						P	Construction impacts			
Monterey Highway Subsection												
Refined Program Alignment	X								Business displacement; biological and cultural resources			
East of Caltrain/UPRR		X	P						S Biological and cultural resources; Disruption to existing railroads; Construction impacts; low speed curve entering Monterey Highway			
Morgan Hill-Gilroy Subsection												
East of UPRR to Downtown Gilroy (Program Alignment)	X								Residential/business displacements; Biological, cultural and agricultural resources			
US 101 to Downtown Gilroy	X								Residential/business displacements; Biological, cultural, agricultural, parkland and visual resources			
Gilroy Station Loop		X						P	Residential/business displacements; Biological, cultural, agricultural, parkland and visual resources; High capital costs; Community concerns			
US 101 to East Gilroy	X								Residential displacements; Biological, cultural, parkland and agricultural resources			
East of UPRR to East Gilroy	X								Residential/business displacements; Biological, cultural and agricultural resources			
Design Option												
Downtown Gilroy: HST Trench	X								Construction impacts; High costs			
Station Location Options												
Morgan Hill Downtown (Four-track)		X						P	Visual resources; Agency concerns			
Downtown Gilroy (Four-track)	X								Business displacements; cultural and visual resources			
Downtown Gilroy (Two-track)		X						P	Cultural and visual resources			
East Gilroy (Four-track)	X								Biological, agricultural and visual resources			
Morgan Hill US 101 at Cochrane (Four-track)		X						P	Agency concerns			
Pacheco Pass Subsection												
Refined Program Alignment	X								Biological, agricultural and parkland resources			
Close Proximity to SR 152	X								Biological, agricultural and parkland resources			
Notes: Reason: Primary (P) and secondary (S) reasons for elimination.												
*Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.												
San Joaquin Valley Crossing Subsection												
Henry Miller Road to Avenue 24 (Revised Program Alignment)	X								Residential displacements; Biological and agricultural resources; Agency concerns			
SR 140		X		S				P	Residential/business displacements; Biological, agricultural and parkland resources; Increased travel time			
South of GEA		X						P	Residential/business displacements; Biological, agricultural and parkland resources; Results in additional time and distance with resulting costs			
Henry Miller Road to SR 152		X	P						Residential/business displacements; Biological and agricultural resources; Agency concerns			
Henry Miller Road to Avenue 21	X								Residential displacements; Biological and agricultural resources			
Henry Miller Road to Avenue 22		X	P					S	Residential displacements; Biological and agricultural resources; Agency concerns			
Notes: Reason: Primary (P) and secondary (S) reasons for elimination.												
*Alignment Eliminated column only applies to station locations. If an alignment is eliminated, a specific station location may no longer be necessary.												

Figure 5.1-1: San Jose to Merced Section—Alignment Alternatives Carried Forward into EIS/EIR



Downtown Aerial Alignment Alternative would be the same length as the Deep Tunnel Alignment Alternative and would have the second fastest journey time. It would perform the best in terms of operating and capital cost factors. The alignment alternative would result in major constructability issues including the construction of high bridge structures over an existing interchange and curved long span bridges. The Downtown Aerial Alignment Alternative would potentially displace 25 to 33 additional single-family residential properties (dwelling units) and 30 to 40 additional multi-family residential dwelling units compared to the Refined PA; it would also result in 10 to 20 additional business property takes. The Downtown Aerial Alignment Alternative would result in visual intrusion due to the construction of a new aerial structure through developed neighborhoods. Finally, construction of an aerial station to the east of the existing Diridon Station could potentially affect the City's planned redevelopment of areas near Diridon Station resulting in high incompatibility with the plans and policies of the City of San Jose. Due to constructability issues, potential displacement effects, visual impacts and constraints on future development, the Downtown Aerial Alignment Alternative is withdrawn from further consideration.

SR 87/I-280 Alignment Alternative was originally recommended by the City of San Jose in response to the City's desire to reduce impacts to the Greater Gardner/North Willow Glen community by moving the HST line away from the middle of the neighborhood (see Figure 4.1-6). Along with the Shallow Tunnel Alignment Alternative, it would have the slowest travel time. The alignment alternative would have potential constructability issues associated with constructing over the SR 87/I-280 interchange, including traffic and detour impacts on these freeways during construction. The SR 87/I-280 Alignment Alternative would move the HST alignment to the north of the Greater Gardner/ North Willow neighborhood mitigating many of the community concerns. The City of San Jose has also recommended that an iconic bridge structure be considered for this alignment. This alignment is viewed by the leaders of the Greater Gardner/North Willow Glen as preferable to the Program Alignment given that it would not pass directly through the neighborhood; therefore, it is carried forward for further study.

STATION LOCATION OPTIONS

Over Diridon Platforms station location option would result in major impacts to existing railroad operations during construction. The City of San Jose has assumed this station location and configuration in related planning studies. This station location option would not result in residential or business displacement. It potentially would affect 2.4 acres of biological resources. The aerial platforms potentially would result in visual impacts to the existing historic depot. The Over Diridon Platforms station location option is carried forward for further consideration because it is compatible with the SR87/I-280 alignment alternative.

Aerial Station (East of Existing Diridon Station) station location option would substantially reduce disruption to existing railroad operations when compared to the Over Diridon Platforms station location option. It would potentially affect the largest acreages of biologically sensitive habitat. This station location option would impact cultural resources including the Diridon Station and would potentially result in temporary effects to 10 acres of parkland. The aerial station would block views of the historic depot from the east resulting in slightly higher visual intrusion when compared to the Over Diridon Platforms station location option. It would potentially interfere with the City of San Jose's redevelopment plans for the areas north, east, and south of the Diridon Station. The Aerial Station (East of Existing Diridon Station) is withdrawn from further consideration because the Downtown Aerial alignment alternative is also withdrawn.

Underground Station (East of Existing Diridon Station) station location option would result in major constructability impacts. It would substantially reduce disruption to existing railroad operations when compared to the Over Diridon Platforms station location option. It would not result in residential or nonresidential displacements. As it would be in a tunnel, there would not be impacts to sensitive biological habitat, cultural resources or the visual character of the area. The Underground Station (East of Existing Diridon Station) station location option is withdrawn from further consideration because the Deep and Shallow Tunnel alignment alternatives are also withdrawn.

5.1.2 MONTEREY HIGHWAY SUBSECTION

Two alignment alternatives were identified within the Monterey Highway subsection for comparison against the evaluation measures:²

- ♦ Refined Program
- ♦ East of Caltrain/UPRR

ALIGNMENT ALTERNATIVES

Refined Program Alignment Alternative would begin south of the Caltrain Tamien Station at West Alma Avenue in the constrained right-of-way between State Route 87 (SR 87) and the existing Peninsula Corridor Joint Powers Board (Caltrain) railroad corridor. The alignment would be aerial from Tamien Station to just north of Almaden Expressway and would be adjacent to and west of the existing tracks. It would be east of SR 87. This alignment allows the HST corridor to be away from east side residences; however, to accomplish this, existing Caltrain and Union Pacific Railroad (UPRR) tracks from West Alma Avenue to just north of Lick would be relocated to the east closer to residences between Tamien Station and Lick. In addition, this would require private non-residential property takes to accommodate the shifting of the UPRR's Luther Siding. The UPRR's Luther Lead track would also require relocation; however, this can be accommodated within the existing UPRR right-of-way.

From just north of Almaden Expressway to just south of Curtner Avenue, the alignment would be at-grade and within the existing Caltrain right-of-way. The two HST tracks would occupy the westerly portion of the existing right-of-way. South of Curtner Avenue the alignment would begin to transition out of the Caltrain right-of-way to be on the west side but immediately adjacent to Caltrain. As the alignment approaches Lick and then Monterey Highway it rises up onto an aerial viaduct to cross over the UPRR tracks and come down into the Monterey Highway corridor just north of the Capital Expressway. From the Tamien Station to Lick the HST tracks would be separated from the UPRR by the Caltrain tracks. Private non-residential property acquisition would be required from south of Curtner Avenue to just south of Lick to accommodate the alignment outside the Caltrain right-of-way.

Once in the Monterey Highway corridor, the alignment would be at-grade and between the UPRR right-of-way and the reconstructed narrower highway. The alignment in the Monterey Highway corridor would also be the same for the East of Tamien Platform alternative. The at-grade configuration would require carefully engineered cross sections for HST and reconstructed Monterey Highway, particularly for the portion south of SR 85. The speed of curve entering Monterey Highway would be 125 mph. Along Monterey Highway, access to the UPRR from the east would be blocked by the HST between just north of Capital Expressway and Coyote. Under this alignment alternative, mature trees along Monterey Highway would be replaced with new landscaping and soundwalls.

The community expressed concern regarding this alignment alternative due to its effects on Monterey Highway (reduction from six lanes to four), landscaping plans, increased traffic congestion, and noise and vibration within the Silverleaf neighborhood. Community concerns regarding the Caltrain Tamien Station area included potential noise impacts and effects to planned parks and trails, residential areas and a day care facility. The New Horizons condominium complex requested that an at-grade rather than aerial solution be evaluated.

Refined Program Alignment Alternative is carried forward for further study; while there are engineering challenges, it allows for more efficient operation than the East of Caltrain/UPRR alternative.

East of Caltrain/UPRR Alignment Alternative is a continuation of the Deep Tunnel and Shallow Tunnel alignment alternatives. As described in Section 4.1 San Jose Station Approach, those alternatives would require the reconstruction of the Caltrain Tamien Station and the SR 87 northbound on ramp, potentially resulting in substantial constructability impacts and disruption to the existing Caltrain railroad system and SR 87 freeway. After rising up out of the tunnel alignment at the Tamien Station, this alignment would continue to rise up onto an aerial structure south of the Tamien Station to cross over Almaden Expressway and the UPRR's Luther Industrial Lead. This portion of the

² One alignment was withdrawn early in the AA process for the Monterey Highway subsection – SR 87/85. This alignment would not meet HST criteria for curve radius; would require construction of an aerial alignment over these freeways, through a residential neighborhood, and across from a high school; and would require relocation of VTA's operating LRT line.

alignment would be in the Caltrain right-of-way, along its east side and adjacent to the UPRR mainline track. The existing Caltrain and UPRR track would be relocated to the westerly side of the Caltrain right-of-way from south of Tamien Station to south of Curtner Avenue to accommodate the HST tracks and its aerial structure within the right-of-way. The aerial structure would also cross over the UPRR's Luther Siding.

After crossing over the Luther Lead, the alignment would come down to grade to cross under the Curtner Avenue Overhead bridge. The alignment remains at grade as it continues south and enters the Monterey Highway corridor on a relatively slow curve of 85 mph. As the alignment approaches Lick it moves to the east outside the right-of-way requiring private property acquisition. The Caltrain and UPRR tracks would return to their existing alignments at Lick.

Once in the Monterey Highway corridor it is on the same alignment as the Refined Program alternative starting just north of Capital Expressway. The community expressed concern regarding this alignment alternative due to its effects on Monterey Highway (reduction from six lanes to four), landscaping plans, increased traffic congestion, and noise and vibration within the Silverleaf neighborhood. Community concerns south of the Caltrain Tamien Station area included potential noise and visual impacts caused by the close proximity of an aerial structure located along the easterly side of the Caltrain right-of-way. **East of Caltrain/UPRR Alignment Alternative is withdrawn from further consideration** because it is impracticable due to constructibility impacts and disruption to the existing Caltrain railroad system and SR 87 freeway as a result of reconstruction of the Caltrain Tamien Station and SR 87 northbound on-ramp. In addition, the alignment would enter the Monterey Highway corridor on a relatively slow curve of 85 mph.

5.1.3 MORGAN HILL – GILROY SUBSECTION

Under this subsection, five alignment alternatives were identified for comparison against the evaluation measures:

- East of UPRR to Downtown Gilroy (Program Alignment)
- US 101 to Downtown Gilroy
- Gilroy Station Loop
- US 101 to East Gilroy
- East of UPRR to East Gilroy

One design option was evaluated in Downtown Gilroy.

- Downtown Gilroy: HST Trench

Five station location options were evaluated:

- Morgan Hill Downtown
- Downtown Gilroy (Four-Track)
- Downtown Gilroy (Two-Track)
- East Gilroy
- Morgan Hill US 101 at Cochrane

ALIGNMENT ALTERNATIVES

East of UPRR to Downtown Gilroy (Program Alignment) Alignment Alternative, identified by the CAHSR Board in 2008 as a preferred alternative, would be predominantly adjacent to and east of the UPRR operating right-of-way and therefore would not deviate much from the existing transportation corridor. This alignment alternative would require reconstruction of a segment of Monterey Highway, just north of Capitol Expressway to north of Morgan Hill. It would be the second longest in terms of travel time (8.73 minutes). It would potentially result in 20 to 35 residential unit displacements and would have the greatest potential for business displacement (25 to 40 units). Potential impacts to biological resources, cultural resources, and farmlands would be relatively high. This alignment alternative would require passing over or under some UPRR non-operating right-of-way near Coyote, in Morgan Hill, San Martin, and Gilroy. Union Pacific has stated in written letters that it will not willingly provide this right-of-way. The East of UPRR to Downtown Gilroy (PA) Alignment Alternative is carried forward for further consideration because it would be adjacent to and east of the UPRR right-of-way, fulfilling the CAHSR Board directive to follow existing transportation corridors to the extent possible in addition to being identified as Preferred by the CAHSR Board in 2008.

US 101 to Downtown Gilroy Alignment Alternative was developed in response to input from the City of Morgan Hill because it would remove the aerial alignment from downtown Morgan Hill. This is the longest alternative in terms of length/distance (32.10 miles) and journey time (8.75 minutes). It is one of the most costly alignment alternatives in terms of capital and operating costs. It would potentially result in ten additional residential property takes (dwelling units) compared to the Program Alignment (PA). Potential impacts to biological resources, farmlands and cultural resources would be relatively high. Considerable visual impacts would occur due to this alternative. This alternative would include an aerial structure that would minimize impacts to wildlife crossings in the sensitive habitat areas of Coyote Valley. The US 101 to Downtown Gilroy Alignment Alternative is carried forward for further consideration because it would remove an aerial alignment from downtown Morgan Hill and would provide an aerial structure for wildlife crossings in the sensitive Coyote Valley area.

Gilroy Station Loop Alignment Alternative would provide two separate station tracks looping from the US 101 to East Gilroy Alignment into a station in Downtown Gilroy. This alignment alternative would have a capital cost factor 36 percent more costly than the PA. Along with the US 101 to East Gilroy Alignment Alternative, it would have the shortest journey time (8.34 minutes) and route length (30.58 miles). It would potentially require five to 15 additional residential property takes (dwelling units) compared to the PA. Potential impacts to cultural resources would be relatively high. A unique feature of this alignment is that it would have community impacts on two areas: both the east of US 101 and downtown Gilroy areas. This alignment alternative would require passing over or under some UPRR non-operating right-of-way near Coyote, in Morgan Hill, San Martin, and Gilroy. Union Pacific has stated in written letters that it will not willingly provide this right-of-way. The City of Gilroy prefers a downtown station if it is in a trench, and agrees that a two-track system in downtown Gilroy would have fewer right-of-way impacts. Moreover, this alignment alternative would have additional visual impacts due to the need for one HST track to pass over the two express mainlines at both north and south of Gilroy and pass over US 101 north of Gilroy. Additionally, concern has been expressed that a Gilroy station could be postponed or eliminated under this alignment alternative, with the express tracks built in advance of the station loop. The Gilroy Station Loop Alignment Alternative is withdrawn from further consideration because of greater environmental impacts including potential residential and business displacement, and increased visual impacts, as well as potential delays in construction or deferral of the Downtown Gilroy Station. It would also have high-capital costs.

US 101 to East Gilroy Alignment Alternative would traverse east of Gilroy thereby eliminating impacts to Downtown Gilroy. It potentially would result in 15 to 25 residential dwelling unit displacements, among the lowest and the least business displacements. The alignment alternative would be among the higher performing alignment alternatives for biological resources. An elevated section near Coyote would also enable better wildlife passage compared to the PA. The US 101 to East Gilroy Alignment Alternative is carried forward for further consideration because it would reduce impacts to Downtown Gilroy and would result in relatively fewer impacts to biological resources.

East of UPRR to East Gilroy Alignment Alternative would traverse east of Gilroy thereby eliminating impacts to Downtown Gilroy. Impacts associated with Downtown Morgan Hill would remain. It potentially would result in fewer residential dwelling unit displacements (20 to 30) and business displacements (5 to 15) when compared to the PA. The alignment alternative would have relatively moderate potential to affect biological, cultural and farmland resources compared to the other alignment alternatives. This alignment alternative would require passing over or under some UPRR non-operating right-of-way near Coyote, in Morgan Hill, and in San Martin. Union Pacific has stated in written letters that it will not willingly provide this right-of-way. The East of UPRR/East of Gilroy Alignment is carried forward for further consideration because of potential to reduce displacements and some of the biological, cultural and agricultural resources.

DESIGN OPTION

Downtown Gilroy: HST Trench Design Option was developed in response to the City of Gilroy's request that the HST and UPRR be placed in a trench. The HST trench excluding the UPRR would be 125-feet wide at the widest section and over three (3) miles long to accommodate four tracks and a station. Including UPRR in the trench would increase the trench length to five miles and its width to 185 feet. It would require use of UPRR operating right-of-way. The Trench design option (without the UPRR) would have the higher capital cost factor and would add nine percent to the cost of the total subsection alignment costs. Including the UPRR in the trench would increase this cost factor. The Trench design option would be the most complicated option to construct because it would entail difficult

below-grade structural construction. Rather than intrude visually with an aerial structure, the trench would place the track below grade and out-of-sight. The Downtown Gilroy: HST Trench Design Option **is carried forward for further consideration** in response to the City of Gilroy to reduce visual impacts in Downtown Gilroy.

STATION LOCATION OPTIONS

Morgan Hill Downtown (Four-Track) Station would result in impacts to existing Caltrain parking during construction. It would potentially involve up to two business displacements. It would require among the fewer takings of biological and cultural resources and would not require parkland or agricultural land. It would require a large parking structure in the downtown area, resulting in major visual intrusion. This station would allow for interconnectivity with proposed train service from Monterey County to the south. The Morgan Hill Station: Downtown Station Location Option **is withdrawn from further consideration** because the City of Morgan Hill did not want an aerial alignment through Downtown Morgan Hill. In addition, a joint resolution between the cities of Morgan Hill and Gilroy states a preference for a HST station in Gilroy because it would better serve the travel shed in the counties to the south.

Downtown Gilroy (Four-Track) Station would result in minor impacts to the Caltrain storage track. It would potentially involve up to two displacements and would require among the fewer takings of biological resources; however, the Gilroy Station is likely to be eligible for the National Register of Historic Places. The aerial structure and a large parking garage would result in visual intrusion in the downtown area. This station would allow for interconnectivity with proposed train service from Monterey County to the south. This station location works with the alternative alignments being carried forward and **is carried forward for further consideration**.

Downtown Gilroy (Two-Track) Station would require relocation of the Caltrain storage track and result in few displacements. It would require among the fewer takings of biological resources; however, the Gilroy Station is likely to be eligible for the National Register. The station location option would not require the permanent use of parkland or agricultural land. The aerial structure and a large parking garage would result in visual intrusion in the downtown area. This station would allow for interconnectivity with proposed train service from Monterey County to the south. This station location **is withdrawn from further consideration** because the Gilroy Station Loop alignment alternative is withdrawn.

East Gilroy (Four-Track) Station would not disrupt existing station service during construction. It would potentially require up to one residential displacement but would affect among the most biological and agricultural resources. Its location in an agricultural area would result in major visual intrusion. This station would not allow for direct interconnectivity with proposed train service from Monterey County to the south. This station location works with the alternative alignments being carried forward and **is also carried forward for further consideration**.

Morgan Hill US 101 at Cochrane (Four-Track) Station would not disrupt existing Caltrain station service. It would potentially displace up to one residential unit. It would not require any cultural resources but seven (7) acres of agricultural lands of status. The station location option would be visually compatible with the surrounding development (big box retail). This station would not allow for direct interconnectivity with proposed train service from Monterey County to the south. The Morgan Hill US 101 at Cochrane Station Location Option **is withdrawn from further consideration** because a joint resolution between the cities of Morgan Hill and Gilroy states a preference for a HST station in Gilroy because it would better serve the travel shed in the counties to the south.

5.1.4 PACHECO PASS SUBSECTION

The Quantm computer model returned 50 least costly possibilities of each alignment variation; of these, a single alignment alternative was identified that met the criteria of constructability, geometric alignment, and cost effectiveness. That alignment was called the Refined Program Alignment because it had similarities to the original program alignment, although it was based on updated geometric criteria. Utilizing information from the Quantm Study, a second alignment was subsequently proposed that diverged from the Refined Program Alignment at the crest of Pacheco Pass and followed close to SR 152 at San Luis Reservoir. It rejoined the Refined Program Alignment just east of the San Joaquin National Cemetery and was named the "Close Proximity to SR 152 Alignment". For purposes of this evaluation, the "Close Proximity to SR 152 Alignment" alternative includes both the divergence area and the common alignment shared with the Refined Program Alignment. This alignment was designed manually, rather than using the Quantm solution.

There are eight tunnels in both alignment alternatives to maintain the grades across the Pacheco Pass. The total length of the Refined Program Alignment tunnels is approximately 53,575 feet. The total length of the Close Proximity to SR 152 Alignment tunnels is approximately 49,775 feet, or about 3,800 feet shorter. The longest tunnel is 22,700 feet long, and three tunnels would be shorter than 1,000 feet.

ALIGNMENT ALTERNATIVES

Refined Program Alignment Alternative was developed using Quantm as a basis for further profile alignments to create the most viable route across Pacheco Pass that would minimize environmental impacts while maintaining a practicable alignment which meets desired design characteristics. The major advantage to the Refined Program Alternative is a conformance to all of the criteria for grades, curves, tunnel length and bridge height. There would be no relocations associated with this alignment and the visual impacts would be evident, but moderate. Potential impacts to biological resources, parkland and important farmland would be high; however, the alignment would be designed to minimize these potential impacts. Table 4 in Appendix B identifies environmental resources impacts avoided due to the alignment alternative being within tunnel. The Refined Program Alignment has a shared common alignment for the area west of the peak of Pacheco Pass. Based on this analysis, the Refined Program Alignment Alternative **is carried forward into further evaluation** to enable additional review of such factors as impacts from construction and maintenance access roads from SR 152 to the right-of-way; impacts on the use of Cottonwood Creek Wildlife Area including hunting; and overall environmental impacts.

Close Proximity to SR 152 Alignment Alternative would be the closest alignment to the existing transportation corridor (SR 152). The alignment alternative was suggested and evaluated as a way to reduce land disturbance due to construction and maintenance access roads from SR 152 to the right-of-way; minimize the total land disturbance impact on the Cottonwood Creek Wildlife Area; and to keep the railway closer to SR 152 which would reduce the impact on hunting in the Cottonwood Creek Wildlife Area, as well as meeting the Authority's design criteria of staying as close to existing transportation corridors as feasible. The Close Proximity to SR 152 Alignment would be easier to construct due to staging adjacent to the highway. It would reduce tunnel access road impacts and would perform well in terms of constructability, with no fatal flaws. It would be the shortest of the alignments and fastest. It would be the most economical in terms of operating and capital cost factors due to a shorter tunnel east of San Luis Reservoir.

This alignment, like the Refined Program Alignment, crosses the San Luis Reservoir on an embankment to avoid seismic design issues associated with the Ortigalita fault. This approach is consistent with the Authority's design criteria for fault crossings. There would be no displacements and the visual effects would be moderate. This alignment alternative minimizes impacts to the Upper Cottonwood Creek Wildlife Area by placing the HST as close to SR 152 as possible without violating HST design standards. This limits the HST's intrusion into the wildlife area and minimizes the length of the access roads that must be provided to access each tunnel portal. There are no significant differences between this alignment and the Refined Program Alignment with regards to impact on biological resources or sensitive habitat. Table 4 in Appendix B identifies environmental resources impacts avoided due to the alignment alternative being within tunnel. While this alignment could have increased potential environmental impacts, principally due to the fact that it could result in an overall shorter length of tunnels, the Close Proximity to SR 152 Alignment Alternative best meets the Authority's objective of following existing transportation corridors and **is carried forward into further evaluation**.

5.1.5 SAN JOAQUIN VALLEY CROSSING SUBSECTION

Within the San Joaquin Valley Crossing subsection, six alignment alternatives were identified for comparison against the evaluation.³

- ♦ Henry Miller Road to Avenue 24 (Revised Program Alignment)
- ♦ SR 140

³ One alignment was withdrawn early in the AA process in the San Joaquin Valley Crossing Subsection: East of Los Banos to SR 152. This alignment would have additional environmental effects on the Grassland Ecological Area as it would introduce an additional corridor with the new crossing to SR 152. It also was not supported by local officials in the City of Los Banos due to possible impacts to existing and proposed City facilities.

- ♦ South of GEA
- ♦ Henry Miller Road to SR 152
- ♦ Henry Miller Road to Avenue 22
- ♦ Henry Miller Road to Avenue 21

ALIGNMENT ALTERNATIVES

Henry Miller Road to Avenue 24 (Revised Program Alignment Alternative) was developed to refine the Program Alignment that was adopted by the CAHSR Board in 2008. It would be the least costly of the Henry Miller alignment alternatives with a capital cost factor 30 percent greater than that of the least costly SR 140 alignment alternative. This alternative would result in the fewest residential displacements. However, the impacts of the wye on the City of Chowchilla are more severe. Henry Miller Road to Avenue 24 is **carried forward for further consideration** to further compare the impacts of this alignment on Chowchilla with the impacts of alignments in the Ave 21 corridor for both the Merced to Fresno and the San Jose to Merced sections.

SR 140 Alignment Alternative would add four (4) minutes travel time between San Francisco and Los Angeles when compared to the Revised Program Alignment Alternative (PA), likely making it incompatible with the travel time requirements in Proposition 1A of 2 hours and 40 minutes between Los Angeles Union Station and the Transbay Terminal in San Francisco. It would be the least costly alignment alternative to Merced due to its shorter length. This alternative would result in the greatest potential for residential displacements, particularly as the alignment approaches Merced and Atwater, resulting in 27 to 34 additional residential property takes (dwelling units) compared to the PA. It would also result in the greatest potential for nonresidential displacements. Although this alignment was designed to be an environmental mitigation alternative, it would still result in considerable biological and parkland impacts, and still bisect the GEA. The SR 140 Alignment Alternative would involve the largest number of agricultural lands of status and would also result in farmland severance in locations where the alignment is away from SR 140. A high-speed train river crossing within a state park would be required under this alignment alternative, resulting in high visual intrusiveness. Because the SR 140 Alignment Alternative is inconsistent with Proposition 1A and does not meet the project's purpose and need due to its increased travel time as well as its high level of impact to residential areas, particularly as the alignment approaches Merced and Atwater, this alignment alternative is **withdrawn from further consideration**.

South of GEA Alignment Alternative would add 14 additional minutes travel time between San Jose and Merced when compared to the PA, resulting in reduced ridership between stations between San Francisco and Sacramento. It also would add 20 additional HST miles with associated environmental impacts and costs. It would be the most costly alignment alternative, with a capital cost factor 2.1 times more costly than the least costly SR 140 alignment. It would perform the best in terms of constructability due to low grading. This alternative would potentially displace the second most residential units. Due to the length of this alignment alternative, it would potentially impact the greatest number of acres of environmentally sensitive habitat, including California tiger salamander, San Joaquin kit fox, California red-legged frog, and vernal pool complexes. The South of GEA Alignment Alternative is **withdrawn from further consideration** due to its higher environmental impacts, residential displacements and high costs.

For the selection or withdrawal of the Henry Miller east-west alternatives (i.e., Avenue 24, SR152, Avenue 22, and Avenue 21), the impacts and characteristics of the wye connection to the Central Valley alignments is critical.

Henry Miller to SR 152 Alignment Alternative built on the north side of SR 152 would cost generally the same as Avenue 22, but would involve two miles of additional length of structure. The median of SR 152 for the eastern portion of the alignment leading to the wye is too narrow for the HST alignment; therefore, if the HST alignment were to be built in the median, it would result in the reconstruction of 14 miles of expressway (SR 152). This alignment alternative would displace 10 to 20 residential dwelling units. It would not directly affect any publicly-owned lands/parklands. This alignment alternative would have some of the least effect on biological resources and important farmlands. The Henry Miller to SR 152 Alignment Alternative is **withdrawn from further study** because it is impracticable due to constructability issues regarding the reconstruction of SR 152 and to the effects of the wye on the City of Chowchilla (see *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*).

Henry Miller Road to Avenue 22 Alignment Alternative was originally developed in response to the City of Chowchilla's concern about impacts of the wye on the city. However, more recent reviews of the wye options show

that these impacts are even further reduced by use of Avenue 21 (see *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*). By bringing the east-west HST line south to Avenue 22, the junction with the Merced to Fresno HST Section would occur in the agricultural area midway between Chowchilla; and therefore, would reduce impacts on the developed areas around the city. Potential impacts to sensitive biological habitat, parklands and cultural resources would be comparable to that of the Henry Miller to Avenue 21 Alignment Alternative; however, it would potentially result in 10 to 15 additional residential displacements as compared to Avenue 21. Due to the remaining impacts of the wye on the city of Chowchilla (See *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*), the Henry Miller Road to Avenue 22 Alignment Alternative is **withdrawn from further consideration**.

Henry Miller to Avenue 21 Alignment Alternative was developed as a refinement of the Avenue 22 Alternative following local agency input, as an alternative alignment running east-west near Avenue 21 that would allow a wye with the Merced to Fresno HST alignment alternatives. The Avenue 21 Alternative resulted in fewer impacts on the Chowchilla airport, existing and proposed development, a proposed major sewer line, a new museum in Fairmead and the Fairmead landfill site, compared to the Avenue 22 alignment alternative. It would deviate from the Program Alignment at the end of Henry Miller Avenue and would involve eight more grade separations compared to the PA before it descends back to grade and curves to align with Avenue 21 ending at the wye (junction) with the Merced to Fresno corridor. This alternative alignment would affect 81 additional acres of farmlands compared to the PA. Henry Miller Road to Avenue 21 Alternative Alignment is **carried forward for further consideration** since it responds to local agencies concerns and reduces impacts of the wye and would not directly affect any publicly-owned lands.

5.1.6 WYE TO MERCED SUBSECTION

This evaluation of the Wye to Merced subsection is based on information contained in the *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*, April 2010. Subsequently, this subsection has undergone further analysis including the identification of an additional wye location at Avenue 21. The updated analysis and wye configuration will be addressed in the next round of review.

The HST San Jose to Merced Section would connect to the Merced to Fresno Section to the east via a railroad wye. A wye is where train tracks branch off a main line to continue in different directions, forming a "Y"-like formation. In this case, the two tracks traveling east-west must become four tracks: a set of two tracks branching northbound and a set of two tracks branching southbound. The location of this wye connection may influence the selection of the route traveling east-west between San Jose and Merced and north-south between Merced and Fresno.

EVALUATION OF ALIGNMENT ALTERNATIVES WITH WYE CONNECTIONS

Four north-south alignment alternatives were identified for comparison against the evaluation measures in the *Alternatives Analysis Report for the Merced to Fresno Section High-Speed Train Project EIR/EIS*:

- ♦ A-1 BNSF
- ♦ A-2 UPRR
- ♦ A-3 West of UPRR
- ♦ A-4 UPRR/BNSF

The *Merced to Fresno AA* compares the four north-south alignment alternatives with wye connection options: Ave 24 Wye, SR 152 Wye, South SR 152 Wye, and SGEA Wye. The AA identifies two of these north-South alignments to be carried forward: A-1 BNSF and A-2 UPRR.

SUMMARY OF STATION OPTIONS RESULTS

Three station location options were evaluated to serve the City of Merced:

- ♦ Castle Commerce Center
- ♦ Downtown Merced Intermodal Transit Center
- ♦ Merced Amtrak Depot

The *Merced to Fresno AA* identifies Downtown Merced Intermodal Transit Station to be carried forward.

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